This report was funded by the Bonneville Power Administration (BPA), U.S. Department of Energy, as part of BPA's program to protect, mitigate, and enhance fish and wildlife affected by the development and operation of hydroelectric facilities on the Columbia River and its tributaries. The views in this report are the author's and do not necessarily represent the views of BPA.

For copies of this report, write to:

Bonneville Power Administration
***Division of* Fish and Wildlife - PJ**
P.O. Box 3621
Portland, OR 97208

HUNGRY HORSE DAM WILDLIFE HABITAT ENHANCEMENT PROJECT

LONG-TERM HABITAT MANAGEMENT PLAN
ELK AND MULE DEER WINTER RANGE ENHANCEMENT
FIREFIGHTER MOUNTAIN AND SPOTTED BEAR WINTER RANGES

Hungry Horse, Montana

June 1990

Prepared by:

Daniel Casey
Patrick Malta
Montana Department of Fish, Wildlife and Parks
Kalispell, Montana

In Cooperation with:
Flathead National Forest
Kalispell, Montana

Funded by:

U.S. Department of Energy
Bonneville Power Administration

Project No. 87-55
Contract No. DE-AI79-87BP36136

TABLE OF CONTENTS

HUNGRY HORSE DAM WILDLIFE HABITAT ENHANCEMENT
PROJECT 87-55

LONG-TERM HABITAT MANAGEMENT PLAN
ELK AND MULE DEER WINTER RANGE ENHANCEMENT
HUNGRY HORSE RESERVOIR
FIREFIGHTER MOUNTAIN AND SPOTTED BEAR WINTER RANGES

RELATIONSHIP TO COLUMBIA RIVER BASIN FISH AND WILDLIFE PROGRAM

The project is being undertaken pursuant to Measure 1003(b)(4) -Table 4 (Hungry Horse Dam) and Action Items 8.8 -8.10 of the Columbia River Basin Fish and Wildlife Program.

Program Goal: Improve winter range on Flathead National Forest lands to support a target carrying capacity of an additional 133 elk (Cervus elaphus). The initial program goal is to enhance 6,650 acres of winter range.

PROJECT GOAL(S)

Rehabilitate 1120 acres of big game (elk and mule deer, Odocoileus hemionus) winter range on the Hungry Horse and Spotted Bear Districts of Flathead National Forest lands adjacent to Hungry Horse Reservoir. This project represents the initial phase of implementation toward the mitigaton goal. A minimum of 547 acres Trust-funded enhancements are called for in this plan. The remainder are part of the typical Forest Service management activities for the project area.

Monitor and evaluate the effects of project implementation on the big game forage base and elk and mule deer populations in the project area. Monitor enhancement success to determine effective acreage to be credited against mitigation goal. Additional enhancement acreage will be selected elsewhere in the Flathead Forest or other lands "adjacent" to the reservoir based on progress toward the mitigation goal as determined through monitoring. The Wildlife Mitigation Trust Fund Advisory Committee will serve to guide decisions regarding future enhancement efforts.

INTRODUCTION

Approximately 8,749 acres of big game (primarily elk and mule deer) winter range were lost to inundation when the Hungry Horse hydroelectric project was completed in 1954 (Casey et al. 1984). Montana Department of Fish, Wildlife and Parks (MDFWP) prepared a wildlife and wildlife habitat mitigation plan, with the cooperation of other agencies, to address such habitat losses in the reservoir area (Bissell and Yde 1985). The Bonneville Power Administration (BPA) subsequently funded a cooperative project with the Flathead National Forest and

MDFWP to develop a long-term habitat enhancement plan for elk and mule deer adjacent to Hungry Horse Reservoir.

This document outlines habitat enhancement activities for the Firefighter Mountain and Dry Parks/Spotted Bear winter range areas, along the east side of the reservoir, and associated monitoring activities. The results of baseline data collection (since 1987) and summaries of the planning process are included in a separate interim report (Casey and Malta, in prep.).

An Environmental Assessment and Decision Notice have been prepared pursuant to the activities outlined for the Firefighter Mountain winter range, and are in Flathead National Forest files. The Decision Notice listed the actions to be implemented over the next decade at Firefighter Mountain. A separate Decision Memo, regarding the use of prescribed fire in the Dry Parks/Spotted Bear area, was issued under an existing EA regarding District-wide use of fire to improve habitat.

This plan identifies specific enhancement site locations and activities, funding responsibilities, and treatment schedules. An itemized estimated activity budget (Appendix A) and conceptual monitoring plan are also included. This plan incorporates those units identified for treatment in a short-term implementation plan (BPA Contract 88-13, #DE-AI179-88BP92986) prepared for BPA in March 1988 (Casey et al. 1988). To date one unit at Dry Parks (Site 1) has been burned, during August 1989.

Firefighter Mountain (Fig. 1) is a traditional winter range which was dominated by fire-created shrubfields at the time Hungry Horse Reservoir was built (Casey et al. 1984). Dense stagnant stands of lodgepole pine now dominate much of the area, which is still inhabited by a population of 120-150 elk (Casey and Malta, in prep.). This population is apparently limited by forage availability under current habitat conditions. The enhancement efforts proposed for the area are therefore primarily aimed at improving the distribution, quantity and quality of available forage for elk and mule deer in the project area. Creation of new foraging areas through timber harvest, and rejuvenation of existing natural openings through the use of prescribed fire, were the enhancement techniques selected.

Dry Parks and the remainder of the Spotted Bear winter range (Fig. 2) are dominated by seral shrublands and are heavily used by a population of about 800 elk (Casey and Malta in prep.). Enhancement opportunities are limited. Rejuvenation of shrub forage through burning was selected as the approach most suited to habitats in the Dry Parks area.

Implementation, monitoring and evaluation activities outlined in this long-term plan will be accomplished through direct cooperation between the Flathead National Forest and MDFWP. Funding for the implementation of the project will initially come from two sources: the timber program of the Flathead National Forest and the Wildlife Mitigation Trust Fund (Table 1). Timber program funds will be used to implement timber harvest on certain enhancement sites where merchantable timber is available, especially in those lodgepole pine stands where there is a high risk of mountian pine beetle infestation. The Wildlife Mitigation Trust Fundwillbe used to fund those enhancement activities involving

no timber harvest, or in some cases, additional activities on timber harvest areas which would not otherwise be feasible using funds generated through the sale. Use of the Trust, established by BPA and MDFWP to fund mitigation for both the Libby and Hungry Horse hydroelectric projects, is guided by an Advisory Committee representing a broad range of interested parties.

Monitoring and evaluation of enhancement activities will be conducted by personnel from both implementing agencies. These efforts will focus on short- and long-termvegetative response, elk and deer population response, and adequacy of the enhancement effort relative to objectives of the mitigation plan. Monitoring will be designed to allow use of the priciple of "adaptive management" to guide ongoing and future enhancement activites.

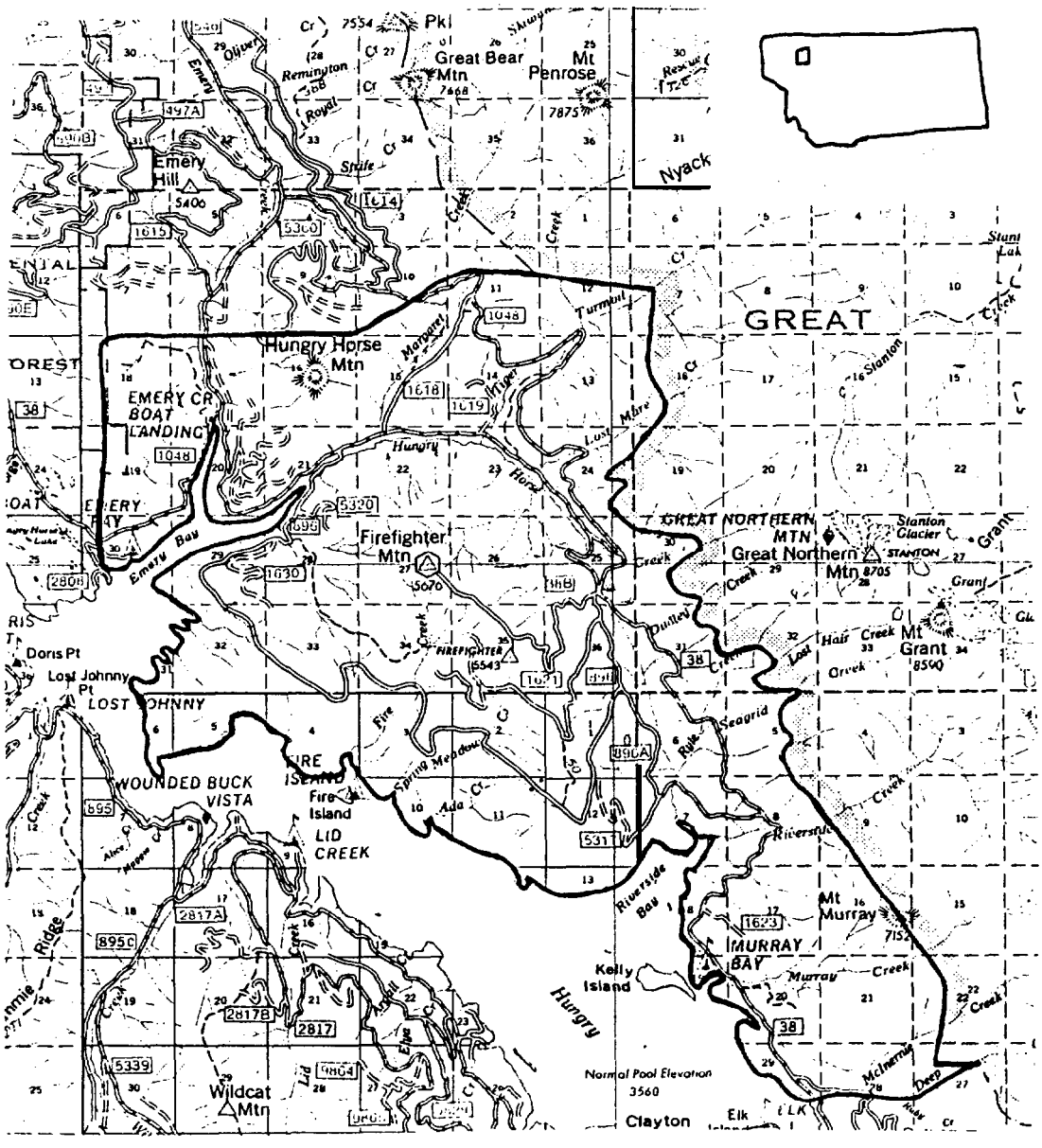


Figure 1. Map of the Firefighter Mountain big game winter range, northwest Montana (Objective 1 Project Area).

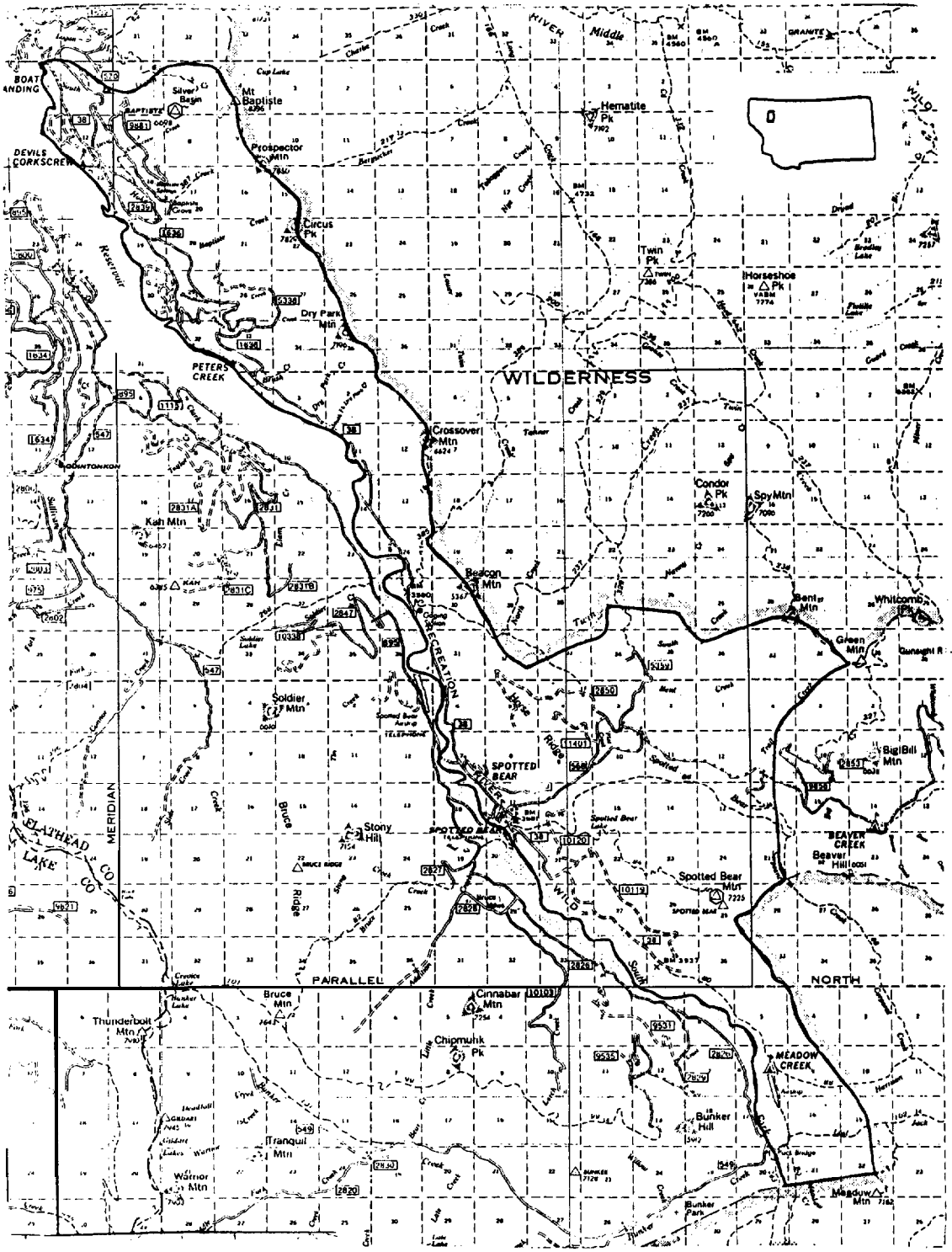


Figure 2. Map of the Dry Parks / Spotted Bear big game winter range, northwest Montana (Objective 2 Project Area).

Table 1. Habitat treatment sites, activities, and funding source, Firefighter Mountain and Dry Parks / Spotted Bear winter ranges., northwest Montana.

Treatment(s)	Treatment Type	Treatment Activities	Funding Source
A,B,C,D,E,02,03,04,06, 10,12,14,15,17,23,24, 25,26,28,34,36,38,39, 42,44,47,48,49,50,51, 52,53,54,55,56,58,60, 61,64,66,69,70,71	Timber Harvest	Sale Prep., Admin.	USFS
		Slash Disposal	USFS
		Prescribed Burn	Trust *
		Replanting	USFS
		Fertilize, Seed	Trust *
		Exclosures	Trust
F,01,11,18,21,22,27, 29,57	Slash and Burn	Slashing	Trust
		Prescribed Bum	Trust
		Replanting	USFS
G,H,I,J,K,L,M,62,63, 2,3,5 (Dry Parks)	Prescribed Burn	(shrubfields)	Trust
09,16,31,33,35,37	Slash Browse		Trust

* Trust will be used to fund post-sale activities if sale proceeds are inadequate for prescribed activities.

TREATMENT ACTIVITIES

Prescribed Burning: Approximately 200 acres in 9 existing natural openings (shrubfields) at Firefighter, and 157 acres in 3 sites at Dry Parks, will be burned during spring or fall to remove decadent woody material, stimulate new growth, and reduce conifer encroachment. This will increase both the quality and quantity of shrub forage available to deer and elk.

Fire will also be used to remove residual slash and recycle nutrients in 51 created openings. Broadcast burning will be the most common method used (46 units), though underburning (4 units) and dozer-piling (1 unit) are prescribed to protect seed trees and better prepare the site for replanting in some cases.

Timber Harvest: Timber harvest will be the primary tool used to remove the forest canopy, allow more light penetration to the forest floor and provide new forage openings. Forty-two forage openings totalling about 573 acres will be created using a variety of timber harvest practices. The trees on approximately 339 acres, in 24 units, are small sawlog size (>8" dbh). Eighteen other units (234 acres) include trees which are primarily post and stake size (<8" dbh).

Slash and Bum: Nine of the openings to be created (totalling approximately 128 acres) include trees which have little or no commercial value because of their stagnant condition or very small size (down to 2" dbh and less). Such sites, without existing road access, are scheduled for slashing and burning, but the District will market the materials as post and stakes and/or pulp before resorting to slashing. On slash and burn units, most or all standing trees will be slashed, allowed to dry at least one year, and broadcast burned.

Slash Browse: Six enhancement sites totalling about 62 acres will be treated through browse slashing. Individual browse plants in poor vigor or too tall to be available to big game would be slashed to allow resprouting. These sites are in forest stands previously thinned and not yet commercially desirable.

Fertilizing and Seeding: Three of the units originally proposed in the short-term plan (Casey et al. 1988) will be fertilized with 100 lb/acre of 16-O-O fertilizer and seeded with 15 lb/acre of a grass-legume mixture as follows: 27% orchard grass, 13% annual rye, 13% common timothy, 20% Canadian bluegrass, and 27% Dutch white clover. This seed mix is tentative, depending on seed availability and prices.

Additional units may be fertilized and/or seeded with the same or adjusted apllication rates, depending on monitoring results gathered from the initial treatment sites.

Replanting: Most created openings lie within Management Area 13, which is defined in the Flathead Forest Plan as big game winter range suitable for timber production. Under current management direction, these openings must therefore be restocked with trees within 5 years after treatment. About

248 acres will be allowed to regenerate (reforest) naturally. The remaining 453 acres would be planted primarily with Douglas-fir (*Pseudotsuga menzesii*), with some western white pine (*Pinus monticola*) and western larch (*Larix occidentalis*). Ponderosa pine (*Pinus ponderosa*) and cottonwood (*Populus sp.*) will be planted on suitable sites. Stocking rates will vary by site and treatment type. Replacement of the existing stagnant lodgepole pine stands with mixed Douglas-fir stands should increase their potential thermal cover value for elk.

A minimum of 66 acres of the harshest sites identified for natural regeneration will be closely monitored for tree regeneration, forage response, and elk use. A site specific amendment to the forest plan to change such sites from MA 13 to MA 13A (big game winter range unsuitable for timber production) will be made, if necessary, to maintain these created openings as permanent foraging areas through re-treatment.

Game proof **Exclosures**: Game-proof exclosures at least 20x50 m in size will be constructed on two paired units to monitor vegetation response with and without fertilization and seeding, free of browsing/grazing pressure by big game. These will be built with 8 ft woven wire fencing on treated wooden posts.

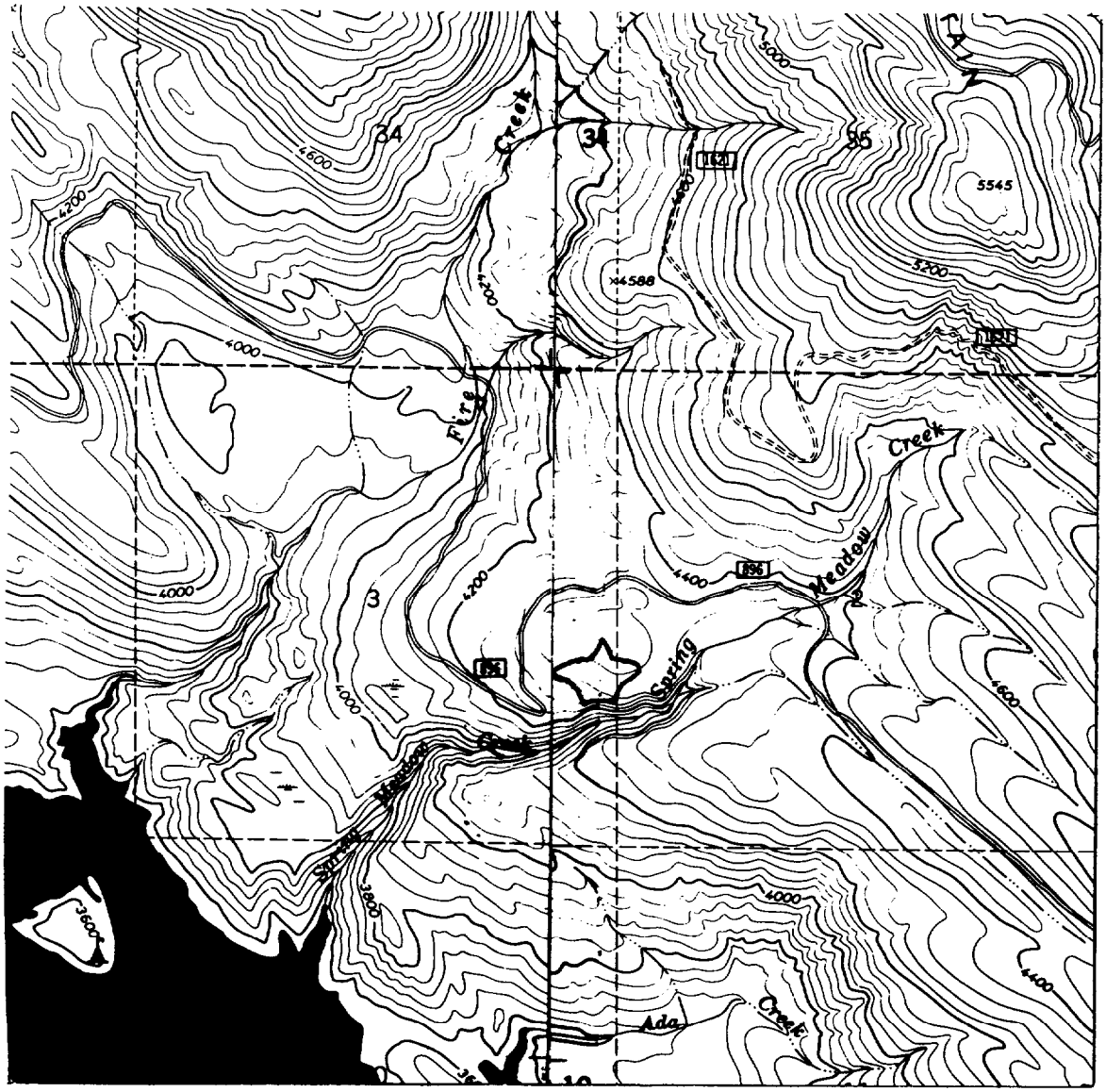
OBJECTIVE 1: Rehabilitate big game winter range in the Firefighter Mountain area adjacent to Hungry Horse Reservoir.

TREATMENT SITES AND SCHEDULE:

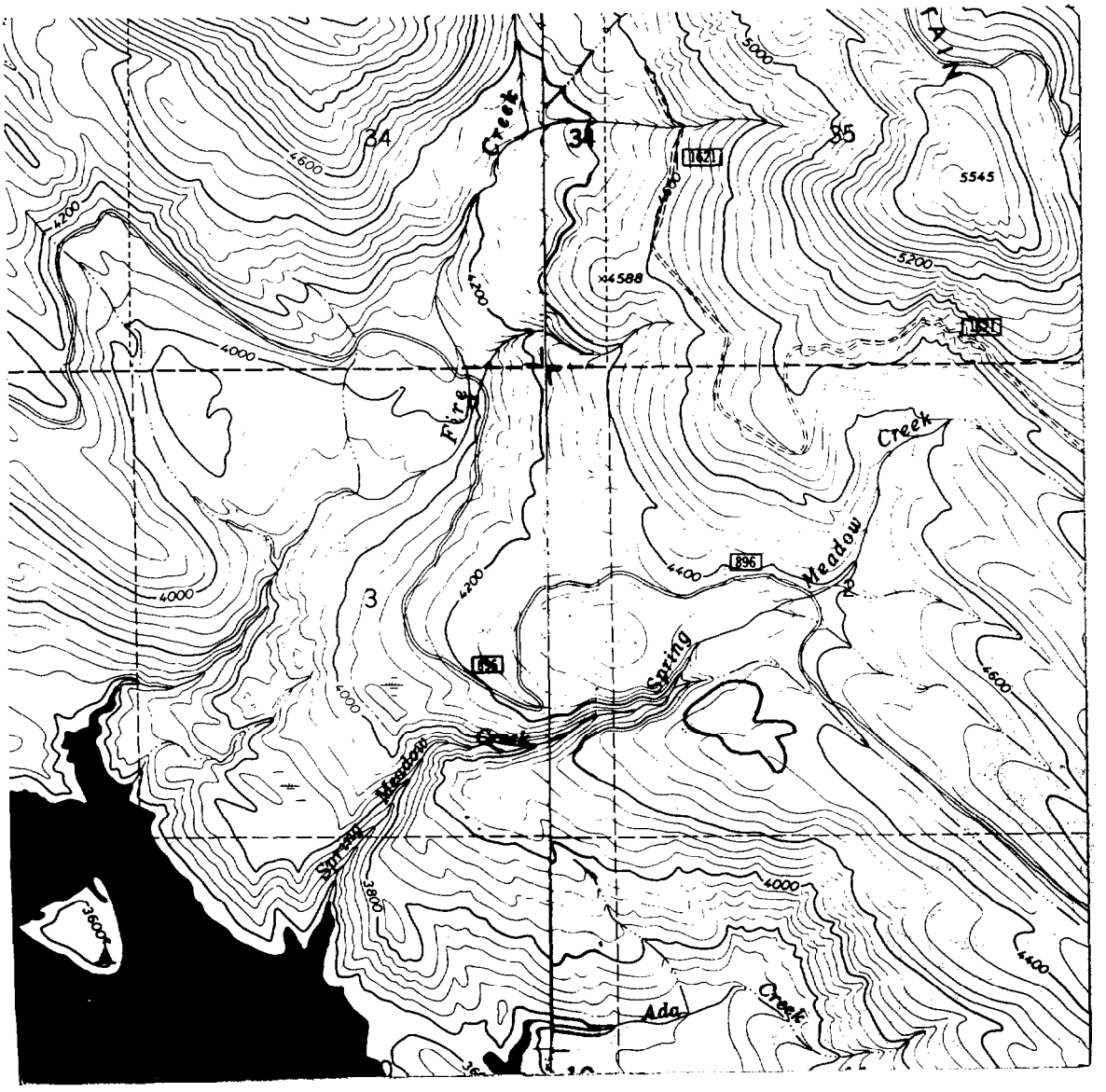
Site	Location*	Acres	Treatment	Dates
A	Sec. 3/T29N/R18W	11	Timber Harvest	91-93
B	Sec. 2/T29N/R18W	20	Timber Harvest	91-93
C	Sec. 2/T29N/R18W	19	Timber Harvest	91-93
D	Sec.12/T29N/R18W	10	Timber Harvest	91-93
E	Sec.12/T29N/R18W	15	Timber Harvest	91-93
F	Sec.11/T29N/R18W	12	Slash and Burn	91-93
G	Sec.28/T30N/R18W	26	Prescr. Burn	91-93
H	Sec.27/T30N/R18W	13	Prescr. Burn	91-93
I	Sec.33/T30N/R18W	26	Prescr. Burn	91-93
J	Sec.32/T30N/R18W	13	Prescr. Burn	91-93
K	Sec.22/T30N/R18W	21	Prescr. Burn	91-93
L	Sec.12/T29N/R18W	19	Prescr. Burn	91-93
M	Sec.34/T30N/R18W	27	Prescr. Burn	91-93
01	Sec.33/T30N/R18W	14	Slash and Burn	94-96
02	Sec.33/T30N/R18W	15	Timber Harvest	94-96
03	Sec.33/T30N/R18W	8	Timber Harvest	94-96
04	Sec.33/T30N/R18W	10	Timber Harvest	94-96
06	Sec.32/T30N/R18W	16	Timber Harvest	94-96
09	Sec.32/T30N/R18W	10	Slash Browse	94-96
10	Sec.32/T30N/R18W	15	Timber Harvest	94-96
11	Sec. 5/T29N/R18W	20	Slash and Burn	94-96
12	Sec.32/T30N/R18W	9	Timber Harvest	94-96
14	Sec.32/T30N/R18W	16	Timber Harvest	94-96
15	Sec.32/T30N/R18W	10	Timber Harvest	94-96
16	Sec.32/T30N/R18W	6	Slash Browse	94-96
17	Sec. 4/T29N/R18W	15	Timber Harvest	94-96
18	Sec.28/T30N/R18W	20	Slash and Burn	94-96
21	Sec.33/T30N/R18W	12	Slash and Burn	94-96
22	Sec.34/T30N/R18W	14	Slash and Burn	94-96
23	Sec.34/T30N/R18W	15	Timber Harvest	94-96
24	Sec.34/T30N/R18W	10	Timber Harvest	94-96
25	Sec.34/T30N/R18W	7	Timber Harvest	94-96
26	Sec. 3/T29N/R18W	12	Timber Harvest	94-96
27	Sec.10/T29N/R18W	10	Slash and Burn	91-93
28	Sec.11/T29N/R18W	15	Timber Harvest	91-93
29	Sec.11/T29N/R18W	10	Slash and Burn	91-93
31	Sec.34/T30N/R18W	20	Slash Browse	91-93
33	Sec.35/T30N/R18W	10	Slash Browse	91-93
34	Sec.34/T30N/R18W	9	Timber Harvest	91-93
35	Sec.35/T30N/R18W	10	Slash Browse	91-93
36	Sec.35/T30N/R18W	7	Timber Harvest	91-93
37	Sec. 3/T29N/R18W	6	Slash Browse	91-93
38	Sec. 3/T29N/R18W	16	Timber Harvest	91-93
39	Sec. 2/T29N/R18W	10	Timber Harvest	91-93

42	Sec. 2/T29N/R18W	14	Timber Harvest	91-93
44	Sec. 2/T29N/R18W	20	Timber Harvest	91-93
47	Sec. 2/T29N/R18W	20	Timber Harvest	91-93
48	Sec.11/T29N/R18W	13	Timber Harvest	91-93
49	Sec.11/T29N/R18W	12	Timber Harvest	91-93
50	Sec. 2/T29N/R18W	15	Timber Harvest	91-93
51	Sec. 2/T29N/R18W	17	Timber Harvest	91-93
52	Sec. 1/T29N/R18W	12	Timber Harvest	91-93
53	Sec.11/T29N/R18W	15	Timber Harvest	91-93
54	Sec.12/T29N/R18W	20	Timber Harvest	91-93
55	Sec.11/T29N/R18W	12	Timber Harvest	91-93
56	Sec.11/T29N/R18W	14	Timber Harvest	91-93
57	Sec.11/T29N/R18W	16	Slash and Burn	91-93
58	Sec.11/T29N/R18W	10	Timber Harvest	91-93
60	Sec.13/T29N/R18W	15	Timber Harvest	91-93
61	Sec. 3/T29N/R18W	9	Timber Harvest	91-93
62	Sec. 5/T29N/R18W	43	Prescr. Burn	91-93
63	Sec. 3/T29N/R18W	12	Prescr. Burn	91-93
64	Sec.13/T29N/R18W	15	Timber Harvest	91-93
66	Sec.13/T29N/R18W	15	Timber Harvest	91-93
69	Sec. 2/T29N/R18W	15	Timber Harvest	91-93
70	Sec. 2/T29N/R18W	10	Timber Harvest	91-93
71	Sec. 2/T29N/R18W	10	Timber Harvest	91-93

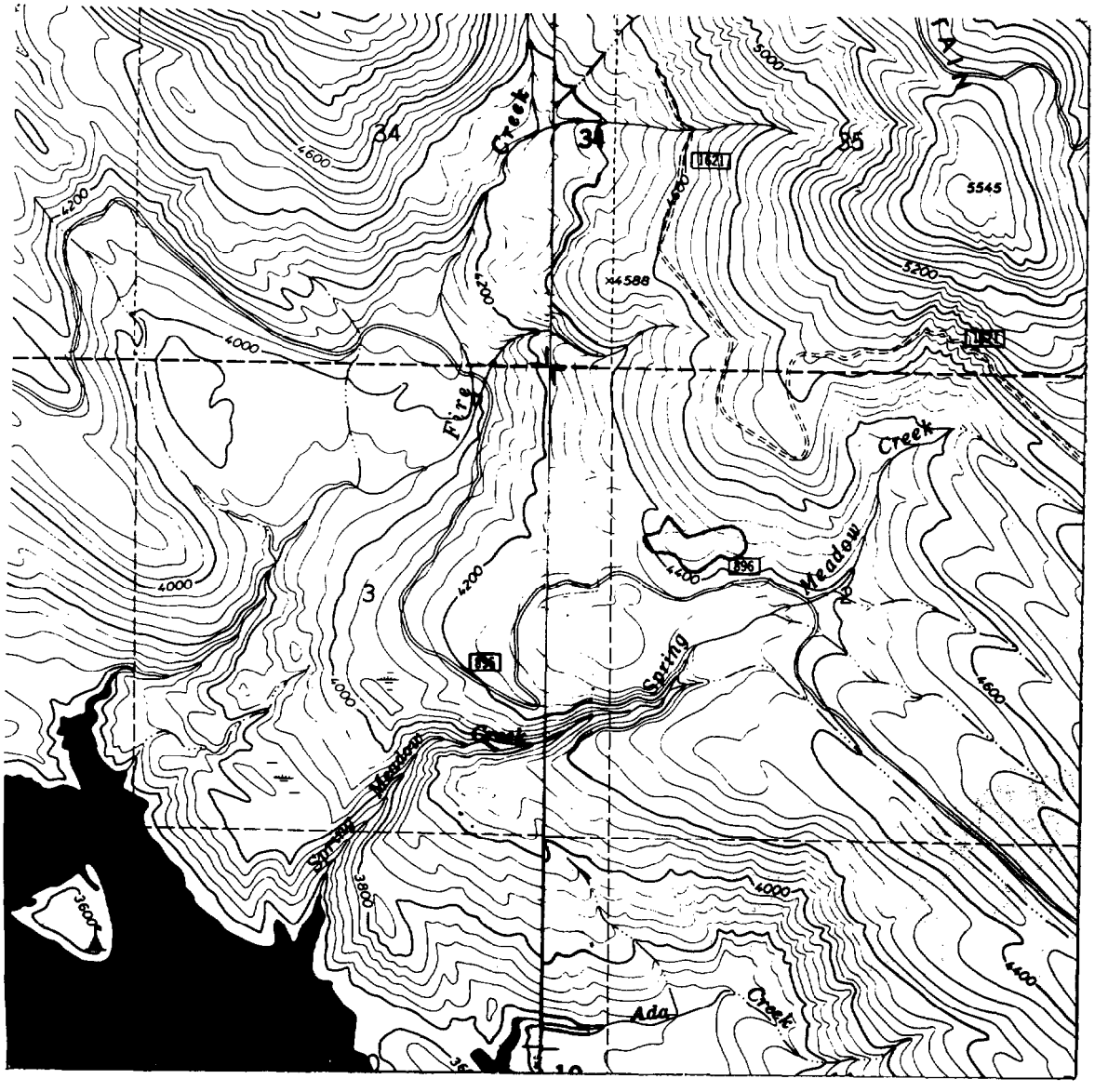
* Section which contains the majority of each site is listed.



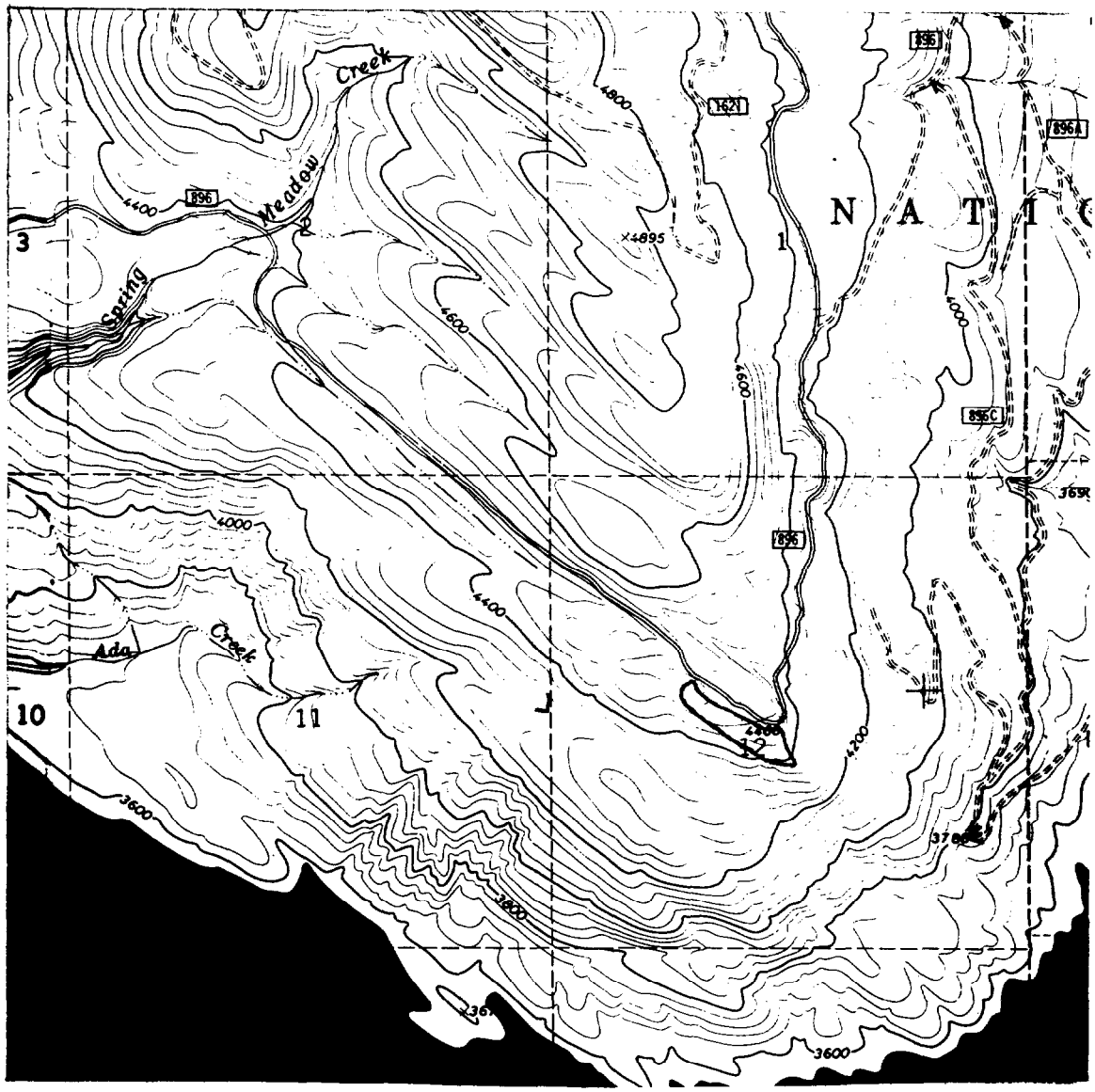
Task 1.1 Harvest (clearcut) 11 acres of stakes and posts in the SE-l/4 Sec.3 and SW-l/4 **Sec.2,T29N,R18W** (Site A). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir. Construct a game-proof **exclosure** 20x50 m in size for analysis of vegetative response.



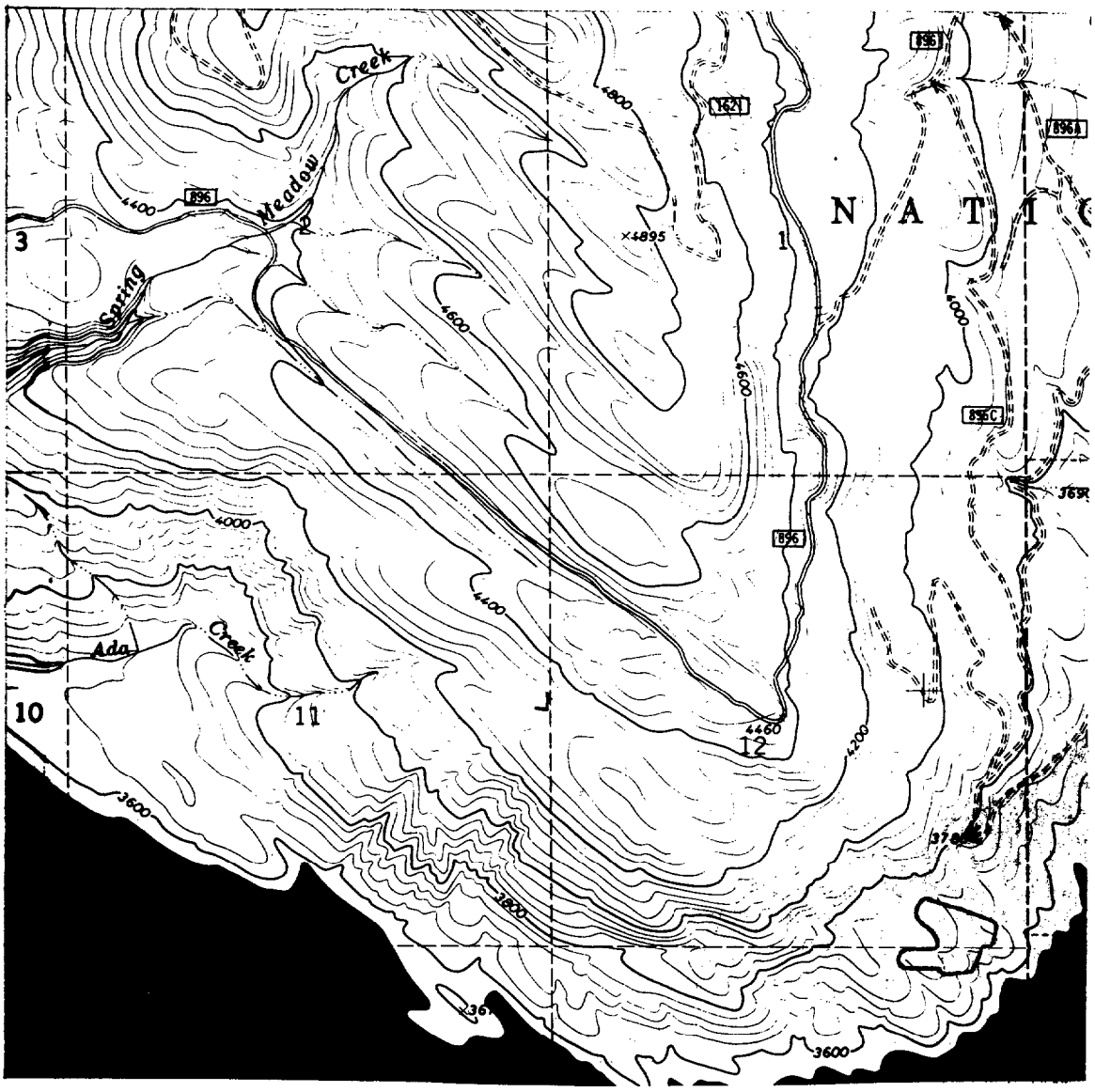
Task 1.2 Harvest (seed tree/clearcut) 20 acres of sawlogs in the SW-l/4 Sec. 2,T29N,R18W (Site B). Dozer pile residual slash for subsequent burning. Construct a game-proof exclosure 20x50 m in size for analysis of vegetative response. Fertilize and seed with grass/legume mixture. Partially plant with Douglas-fir.



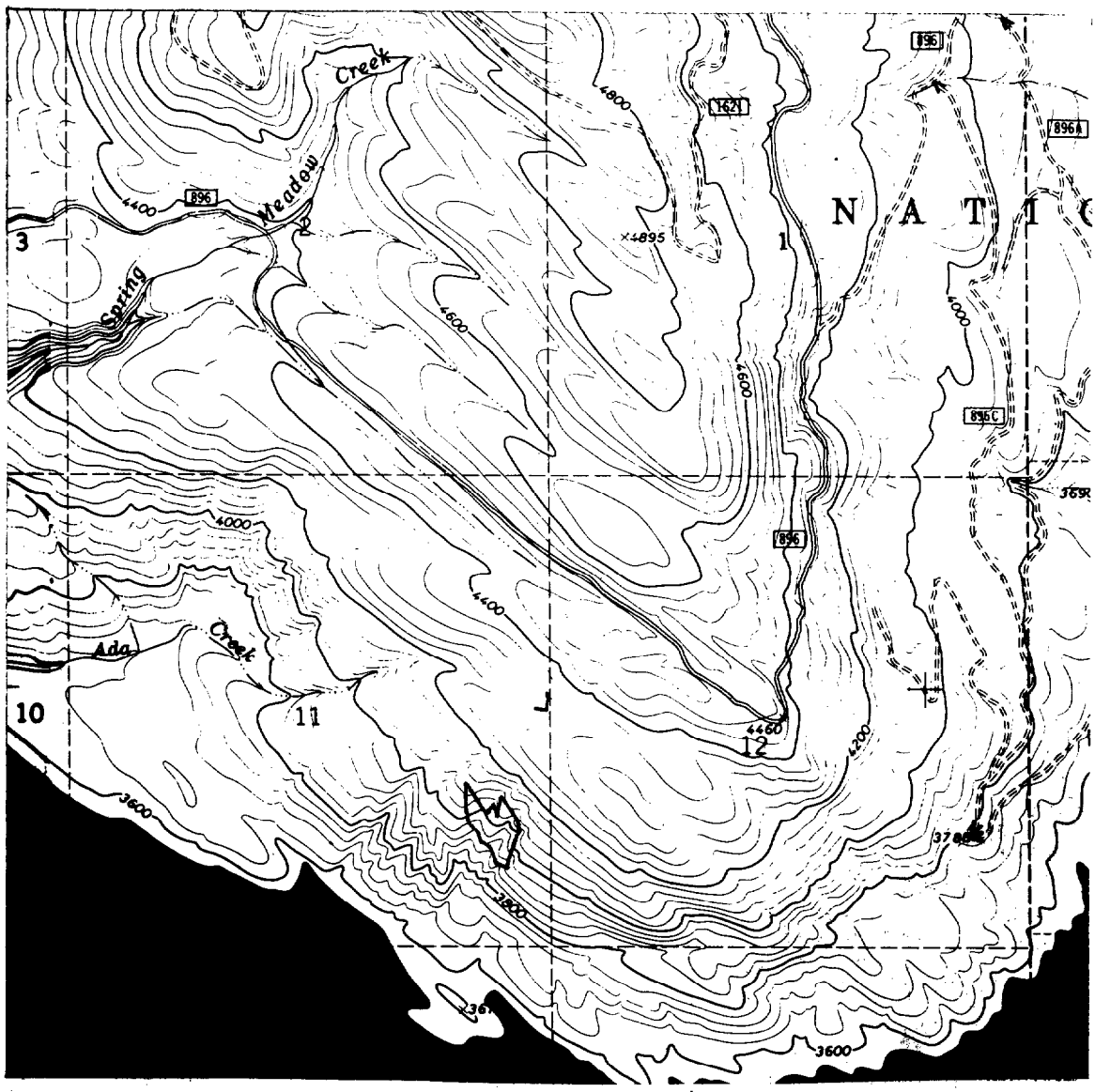
Task 1.3 Harvest (seed tree/clearcut) 19 acres of sawlogs in the NW-1/4 Sec. 2,T29N,R18W (Site C). Broadcast burn residual slash during subsequent fall. Partially plant with Douglas-fir.



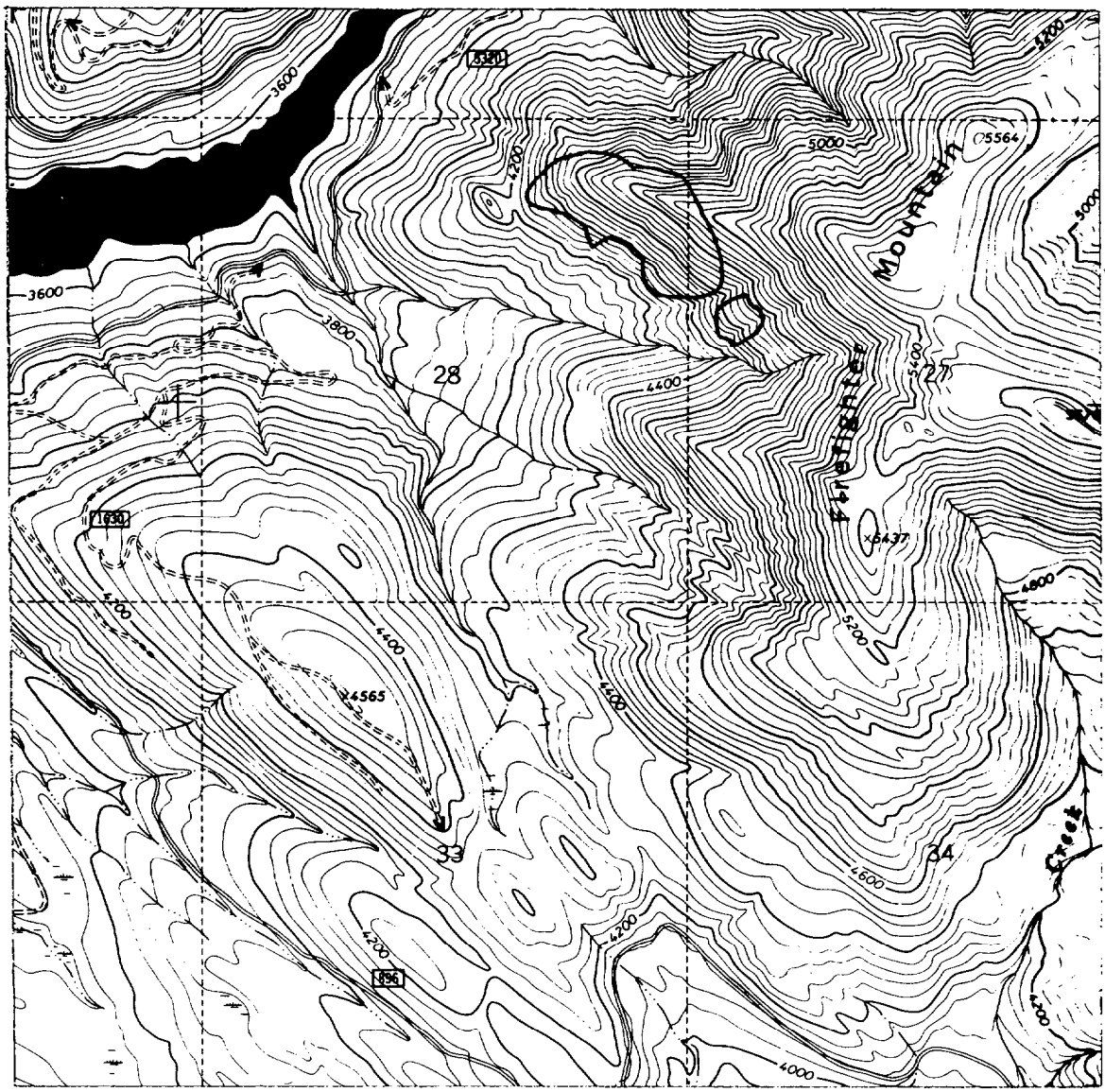
Task 1.4 Harvest (clearcut) 10 acres of stakes and posts in the W-1/2 Sec.12,T29N,R18W (Site D). Broadcast burn residual slash during subsequent fall. Fertilize and seed with grass/legume mixture.



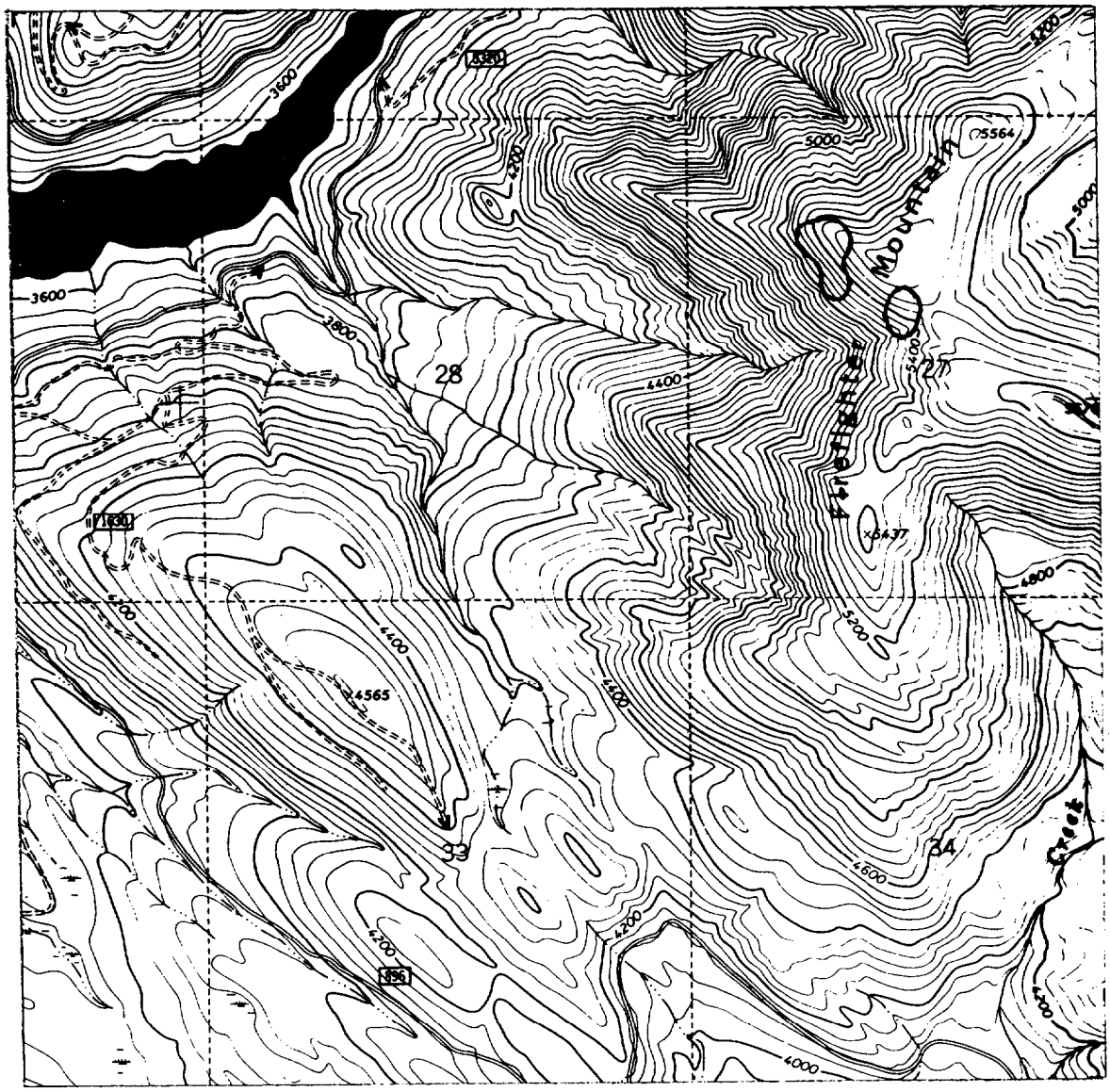
Task 1.5 Harvest (clearcut) 15 acres of sawlogs in the SE-l/4 Sec.12,T29N,R18W (Site E). Broadcast burn residual slash during subsequent spring. Fertilize and seed with grass/legume mixture. Plant with Douglas-fir.



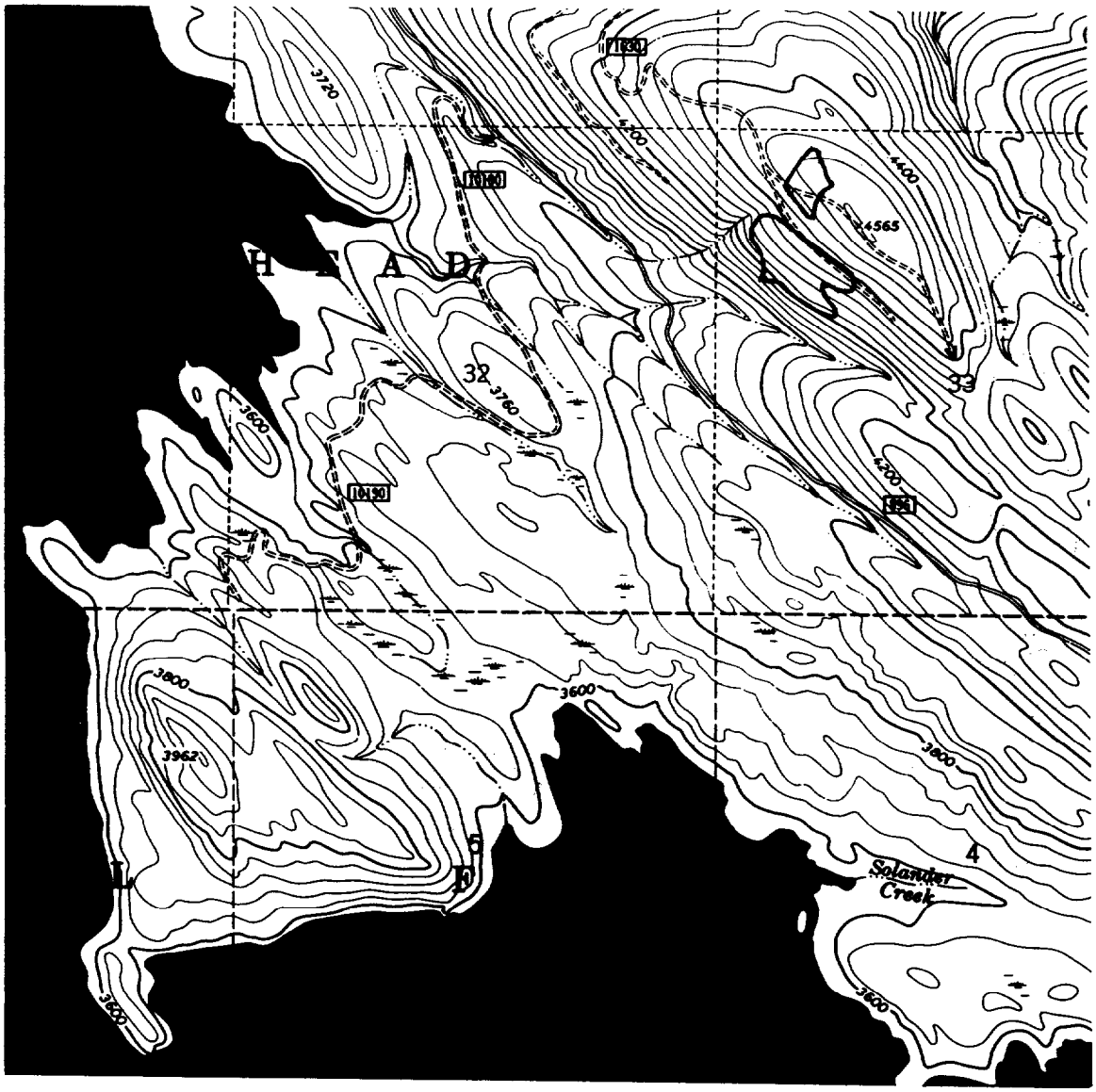
Task 1.6 Slash and burn (during fall) 12 acres of lodgepole pine in the SE-1/4 Sec.11,T29N,R18W (Site F).



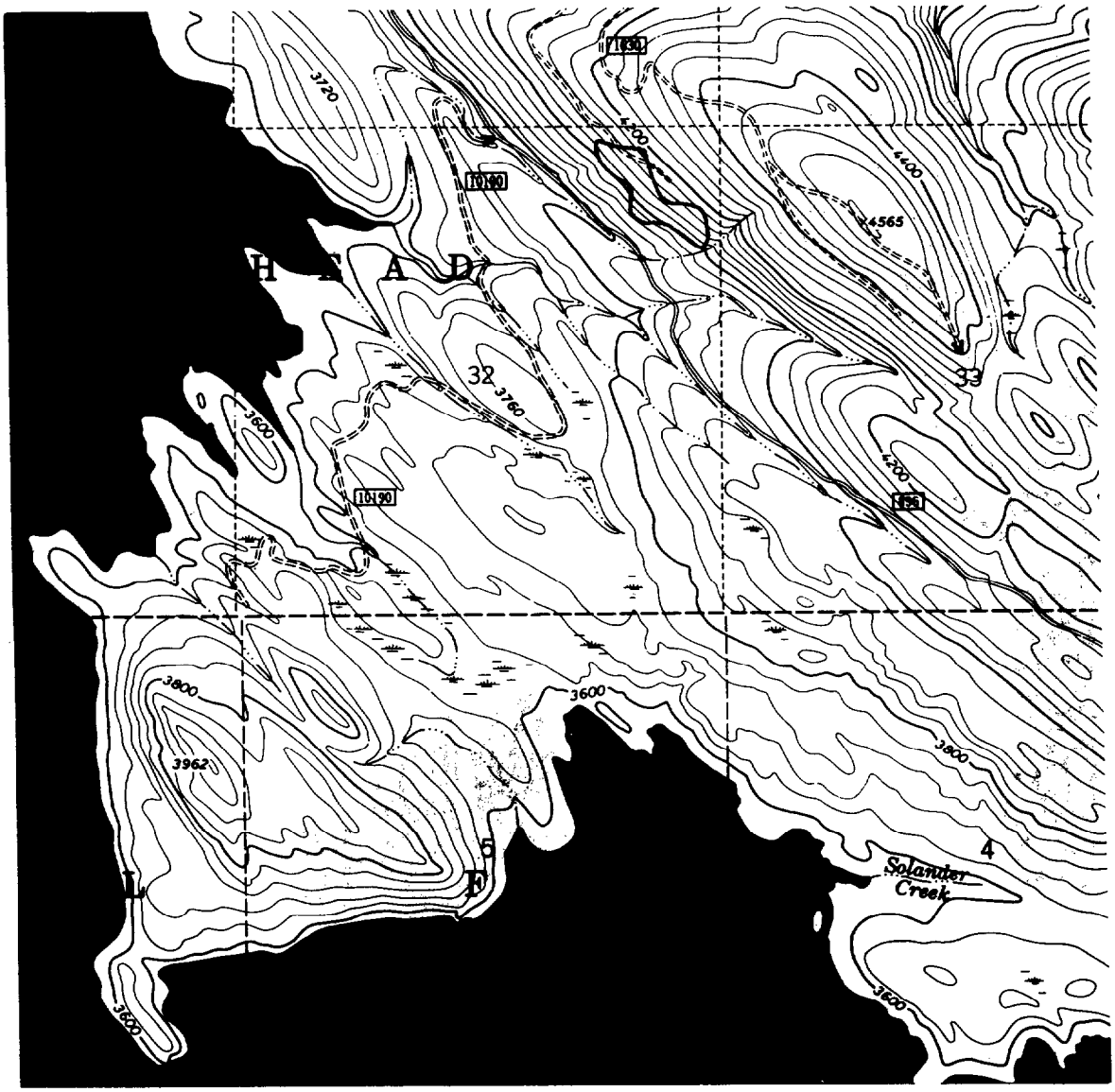
Task 1.7 Broadcast burn 26 acres of shrubland in the NE-l/4 Sec.28, and NW-1/4 Sec.27,T30,R18W (Site G).



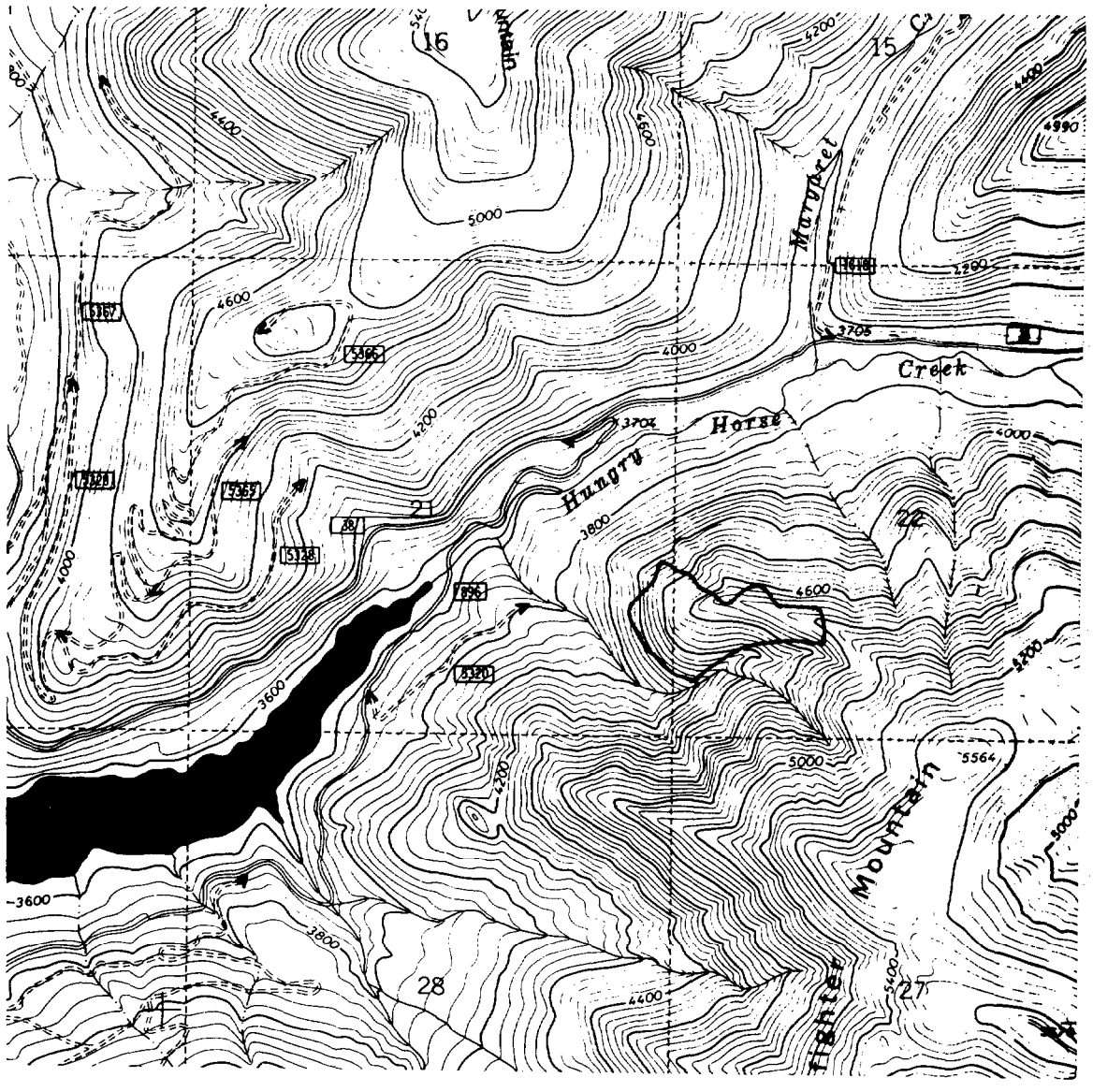
Task 1.8 Broadcast burn 13 acres of shrubland in the NW-l/4 Sec.27,T3ON,R18W (Site H).



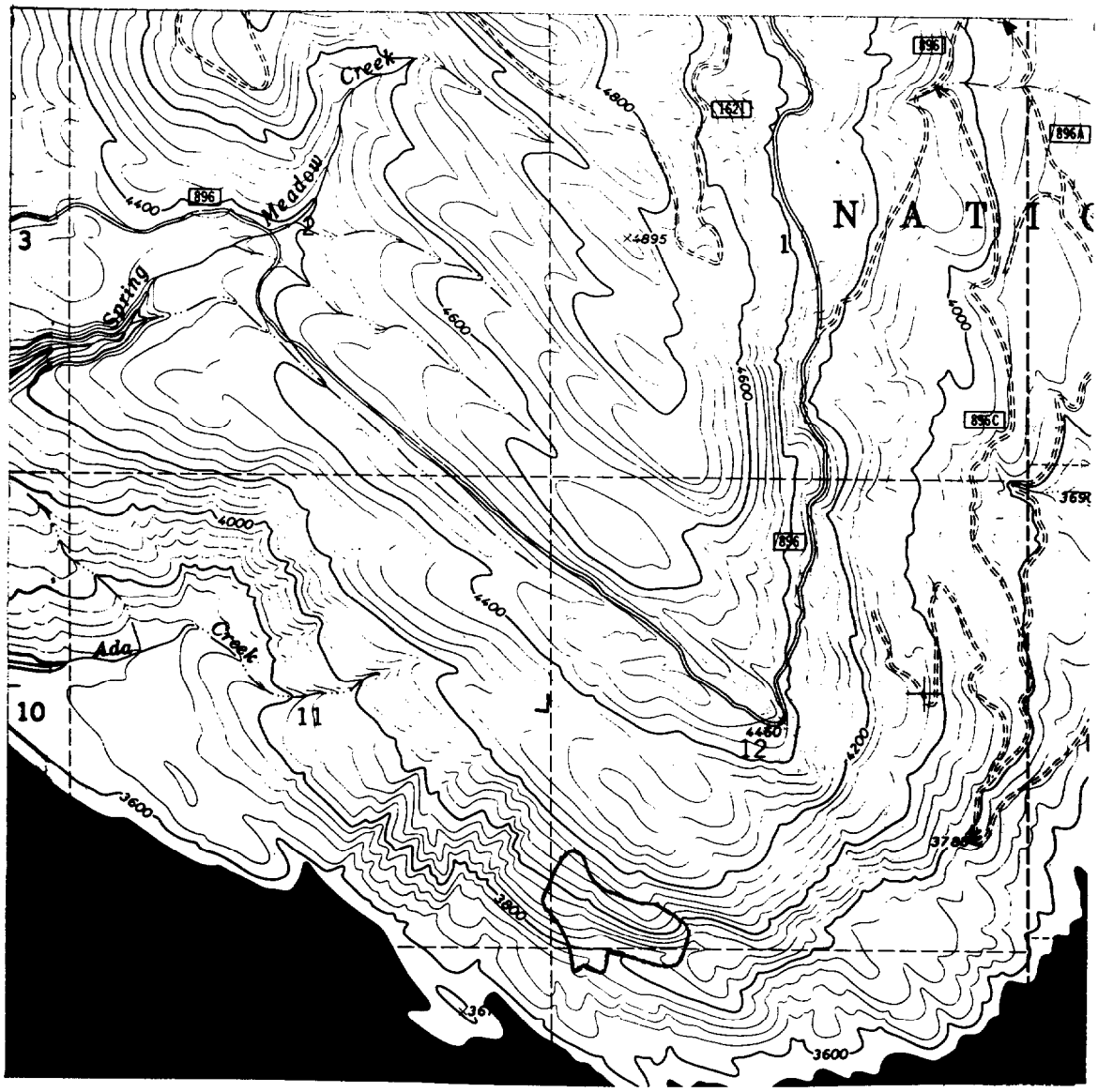
Task 1.9 Broadcast burn 26 acres of shrubland in the NW-l/4 Sec.33,T3ON,R18W (Site I).



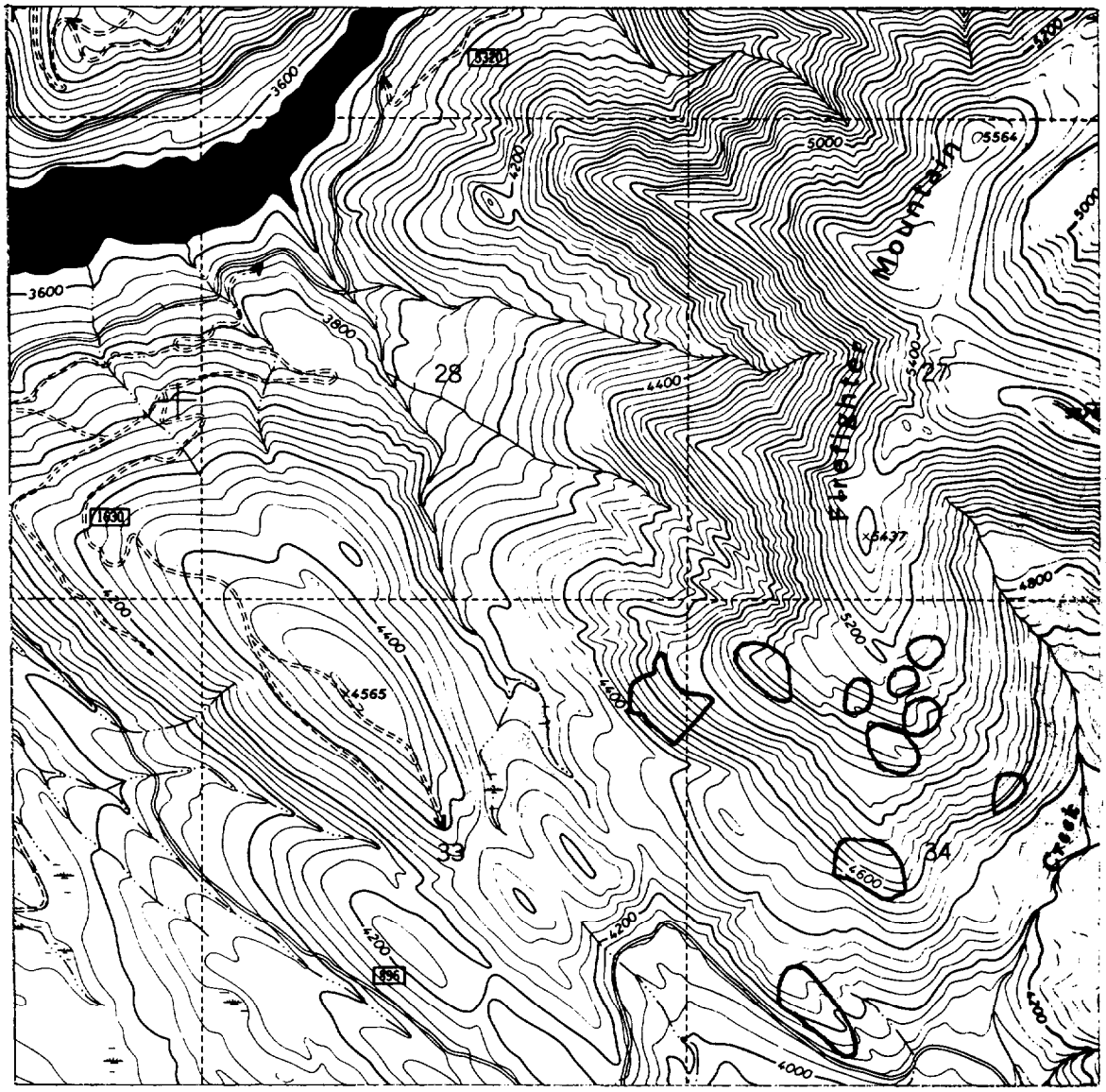
Task 1.10 Broadcast burn 13 acres in the NE-l/4 Sec.32,T3ON,R18W (Site J).



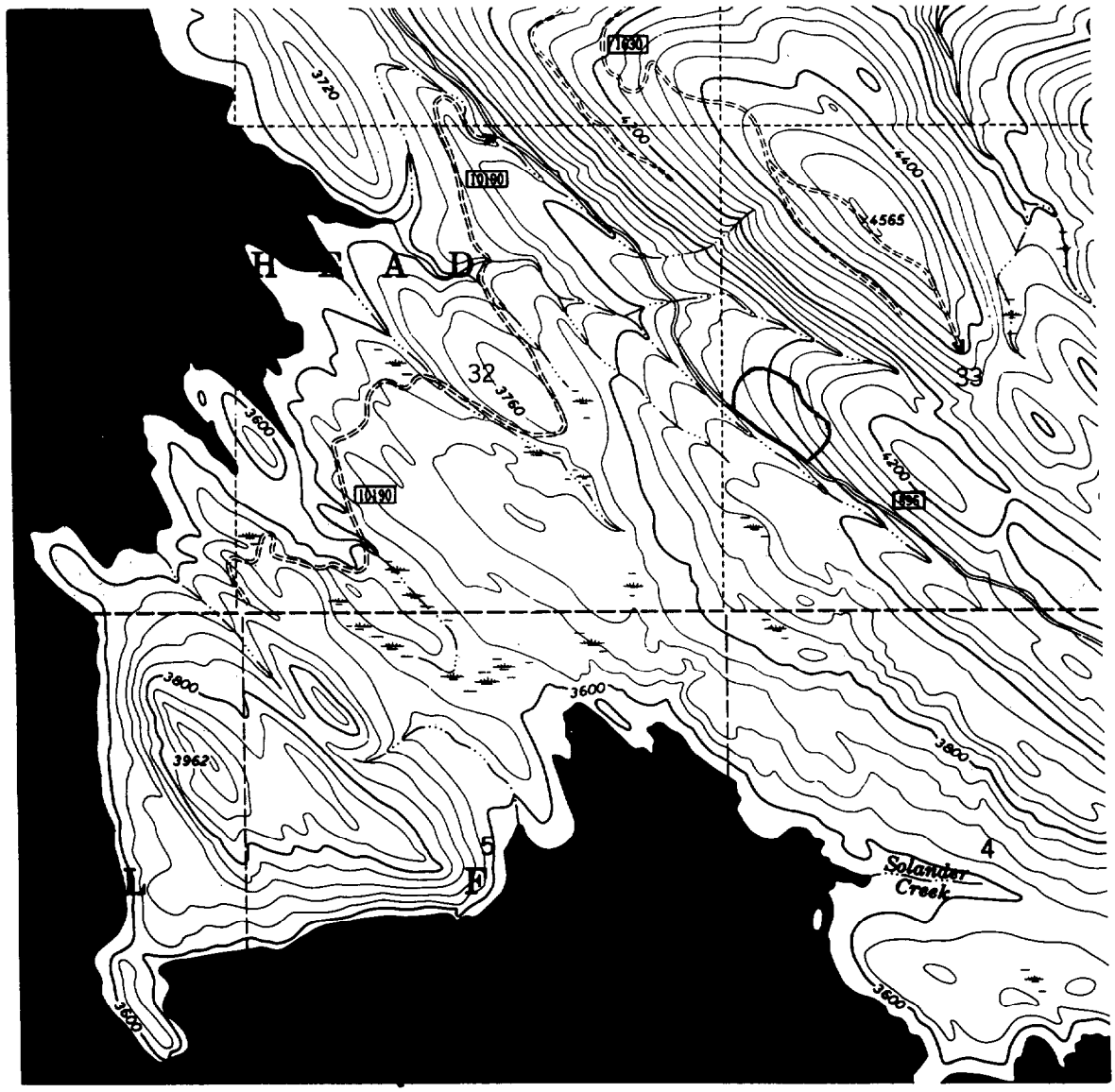
Task 1.11 Broadcast burn 21 acres of shrubland in the SW-l/4 Sec.22, and SE-1/4 Sec.21,T30N,R18W (Site K).



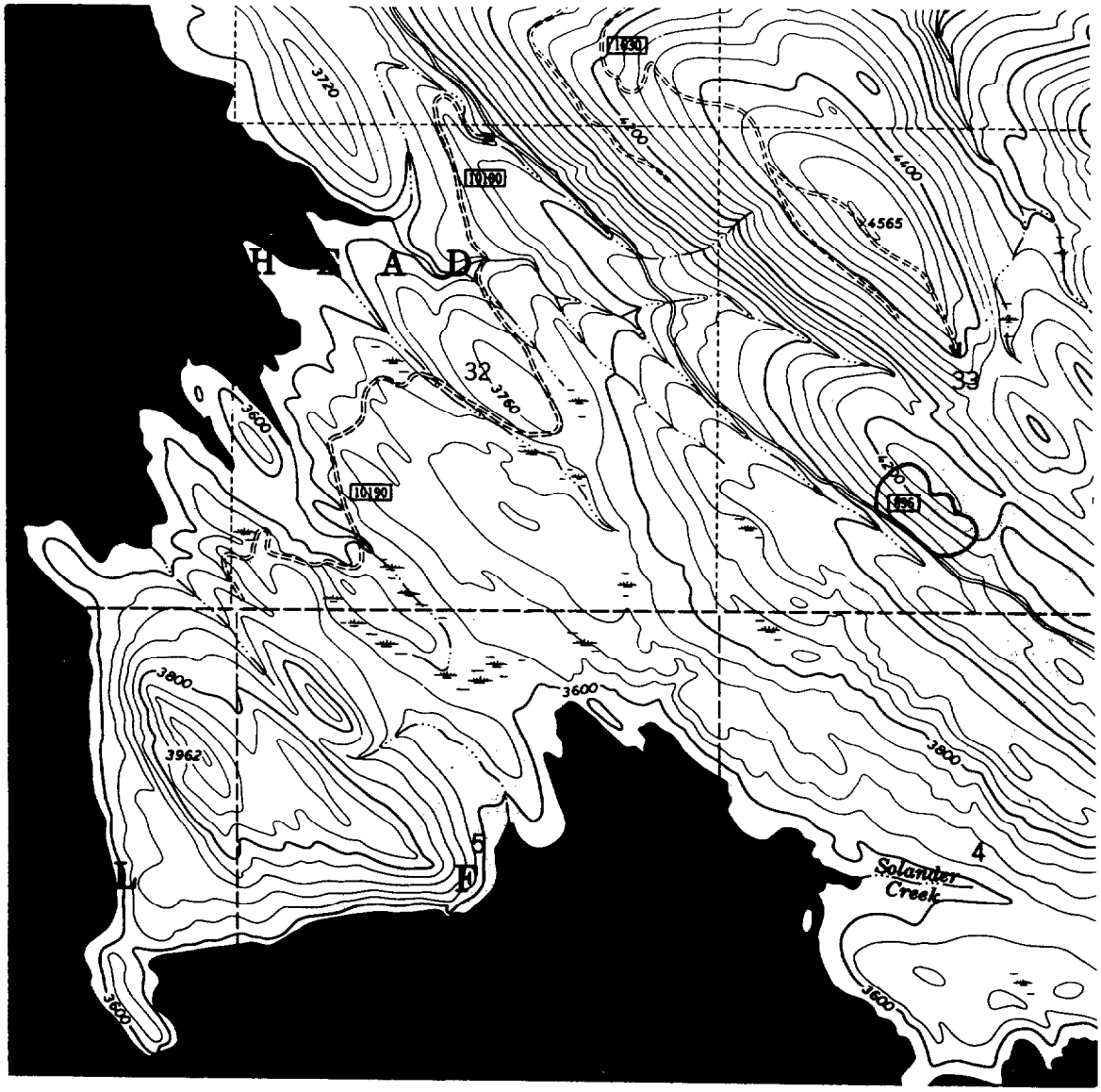
Task 1.12 Broadcast burn 19 acres of shrubland in the SW-l/4 Sec.12, and NW-1/4 Sec.13,T30N,R18W (Site L).



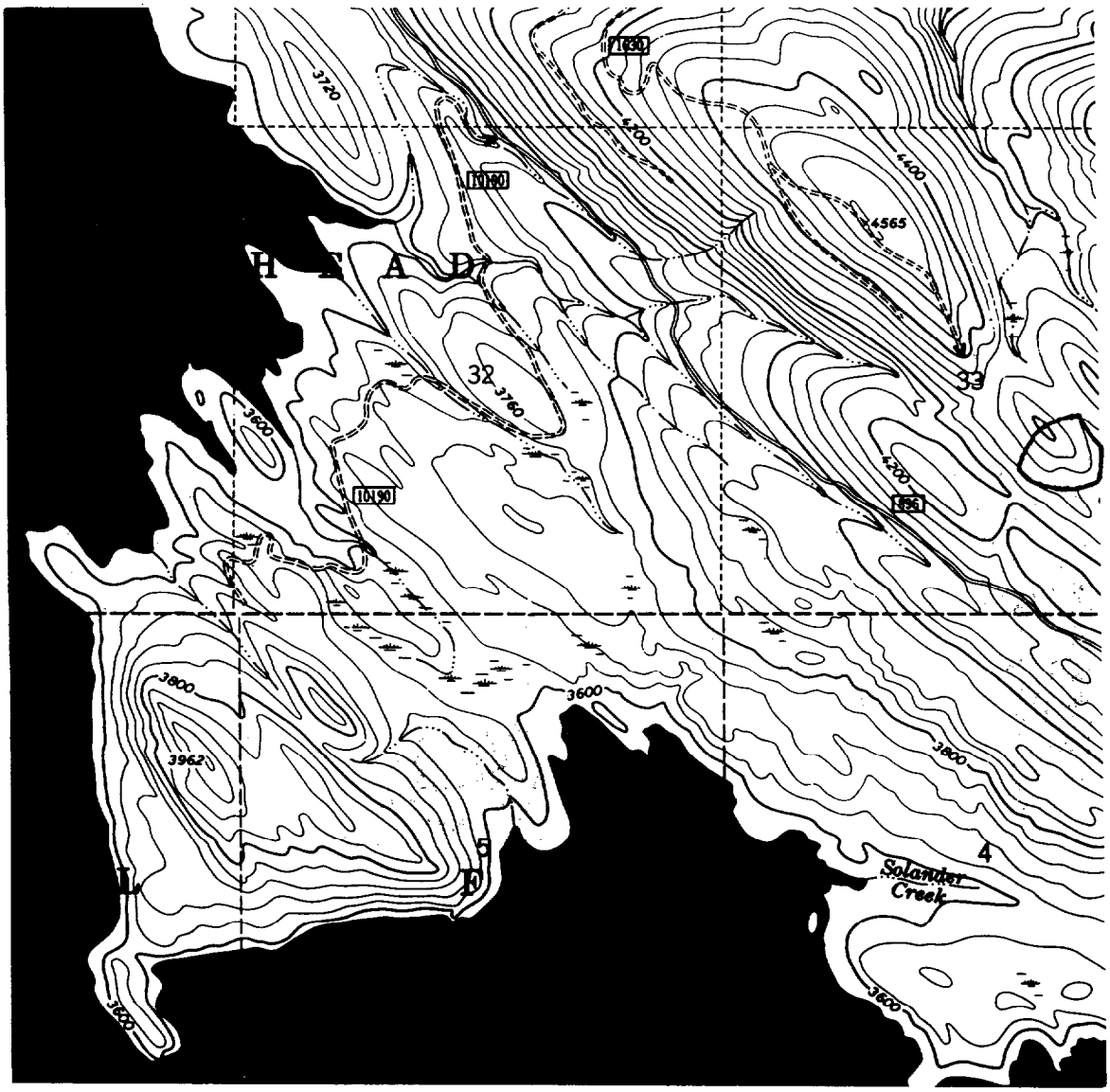
Task 1.13 Broadcast burn 27 acres of shrubland in the SW-l/4 Sec.34, N-i/2 Sec.34, and NE-l/4 Sec.33, T3ON,R18W (Site M).



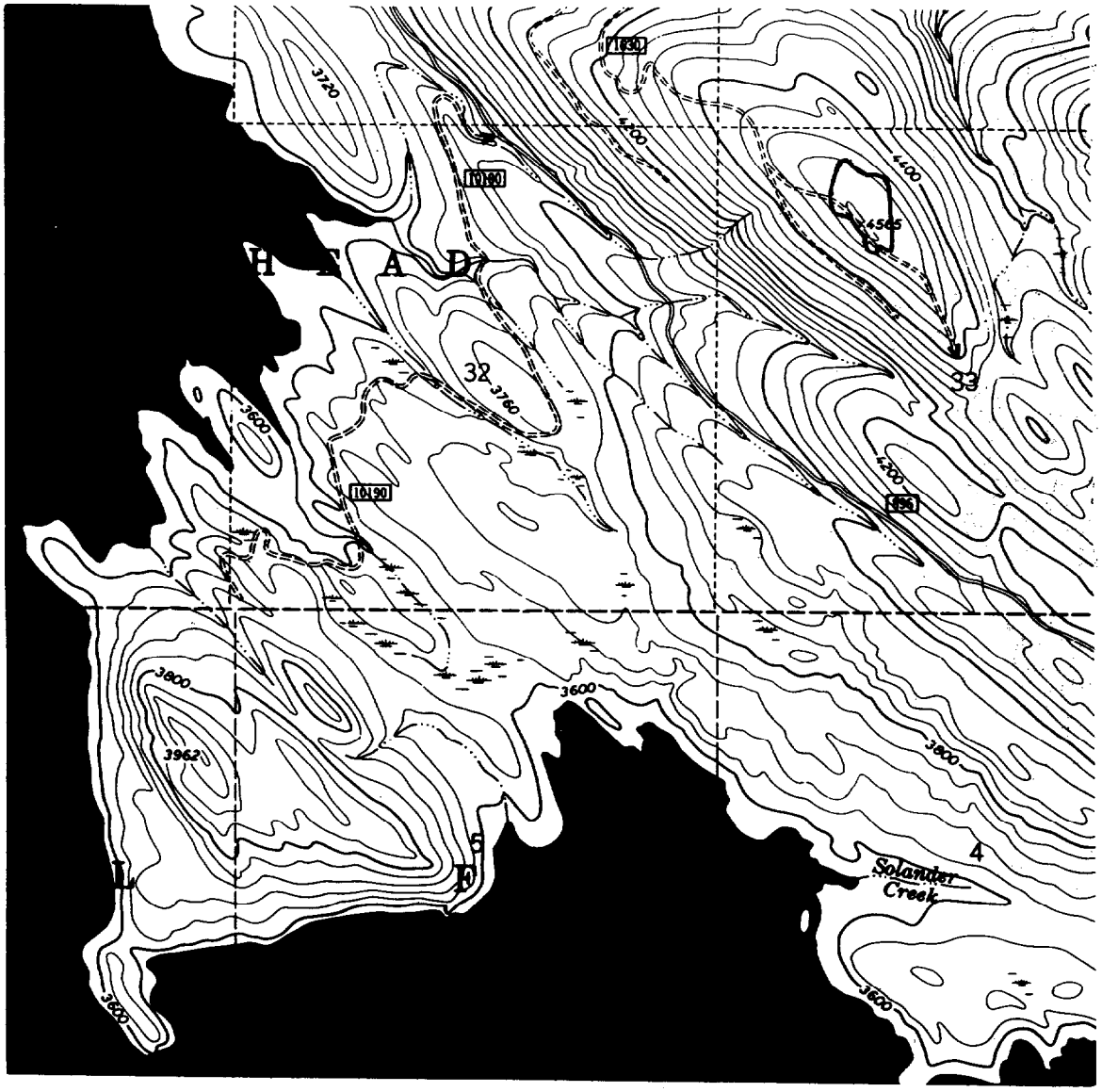
Task 1.14 Slash and broadcast burn (during spring) 14 acres of lodgepole pine in the SW-l/4 Sec.33,T3ON,R18W (Site 01). Plant with Douglas-fir.



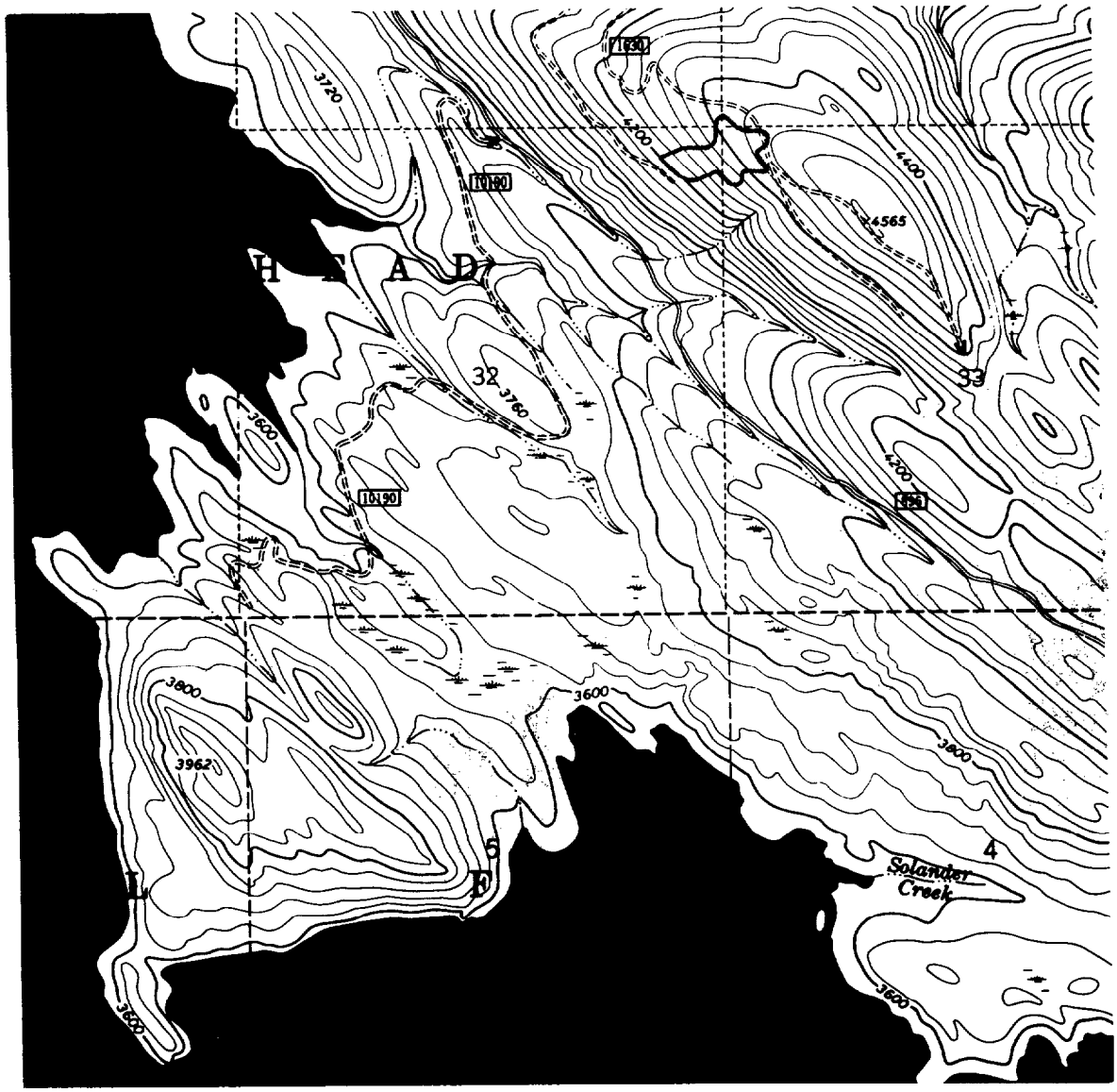
Task 1.15 Harvest (seed tree/clearcut) 15 acres of posts, poles and sawlogs in the SW-l/4 Sec.33,T3ON,R18W (Site 02). Conduct underburn during subsequent fall to remove residual slash.



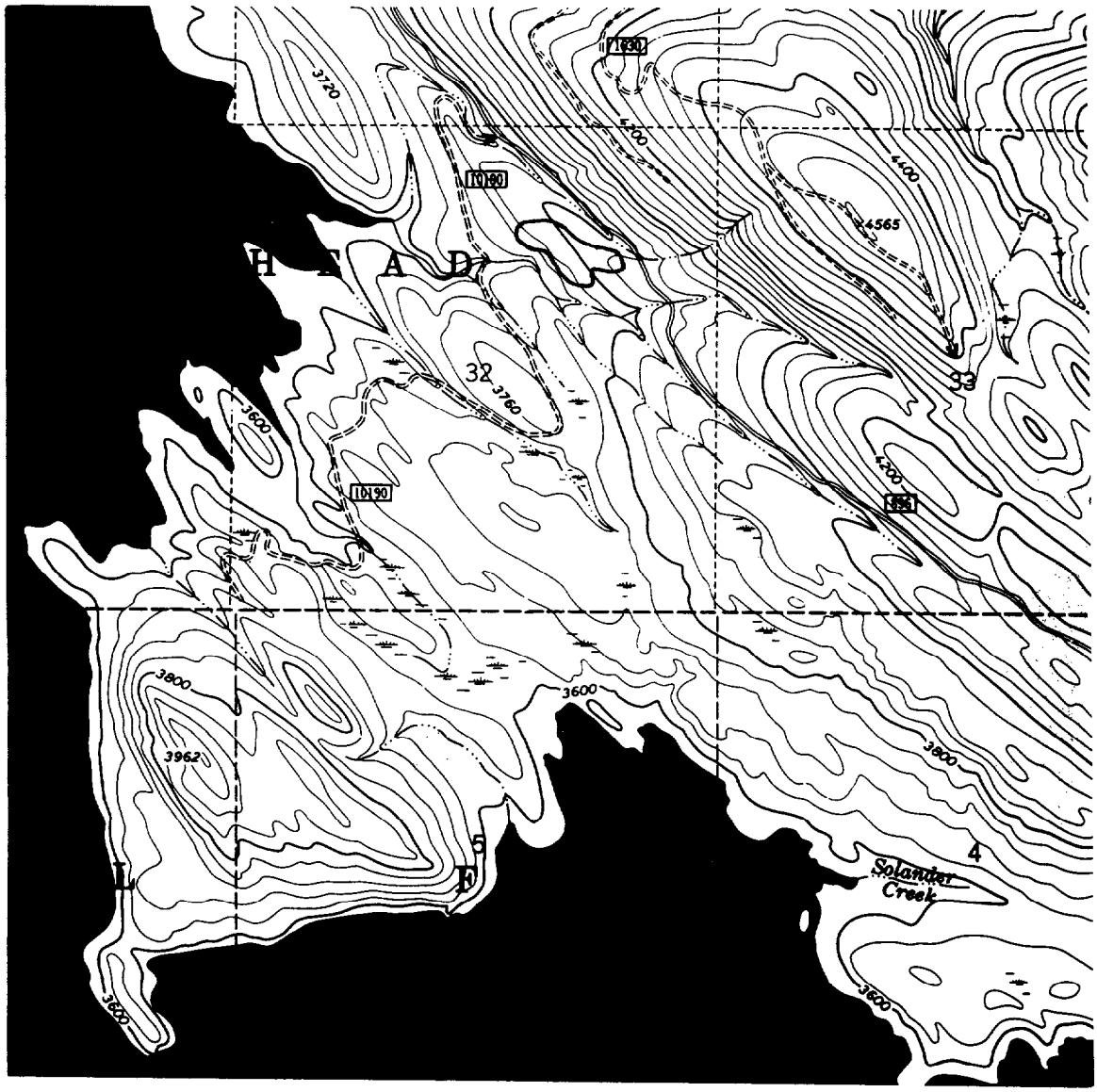
Task 1.16 Harvest (seed tree/clearcut) 8 acres of sawlogs in the SE-1/4 Sec.33,T30N,R18W (Site 03). Conductunderburn during subsequent fall to remove residual slash.



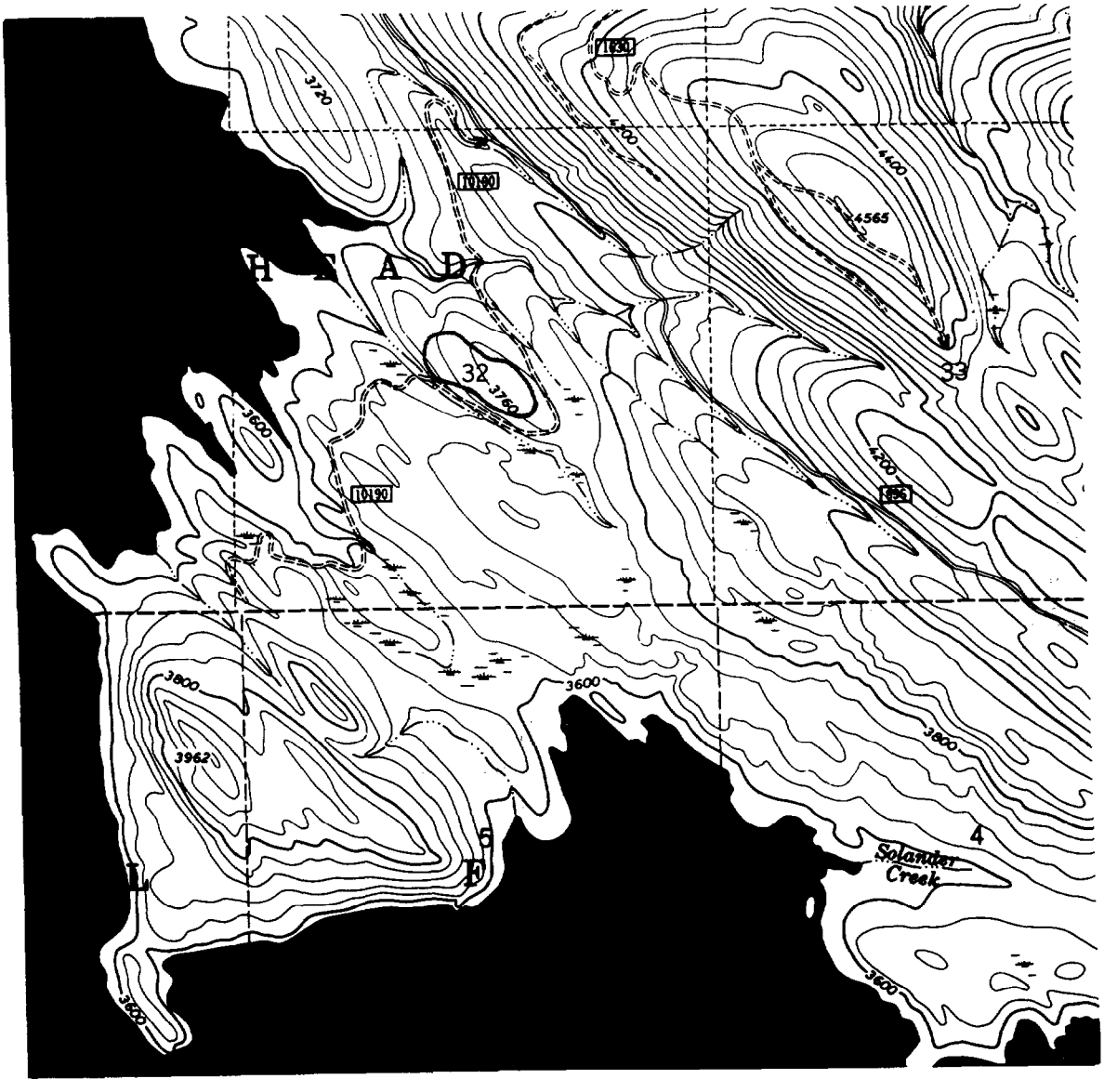
Task 1.17 Harvest (clearcut) 10 acres of stakes and posts in the NW-l/4 Sec.33,T30N,R18W (Site 04). Broadcast burn residual slash during subsequent fall.



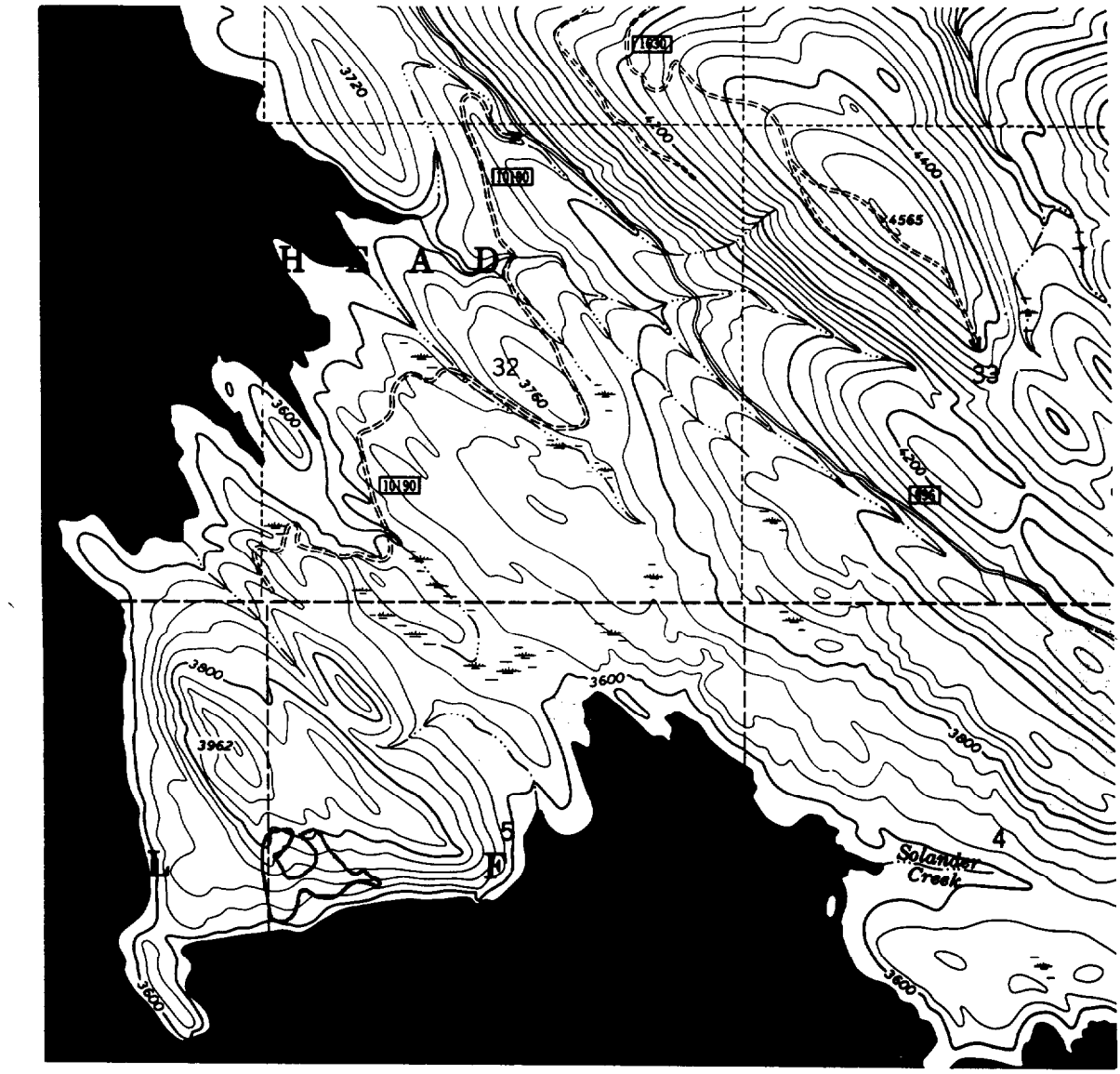
Task 1.18 Harvest (clearcut) 16 acres of sawlogs in the NE-l/4 Sec.32, and NW-1/4 Sec.33,T3ON,R18W (Site 06). Broadcast burn residual slash during subsequent fall.



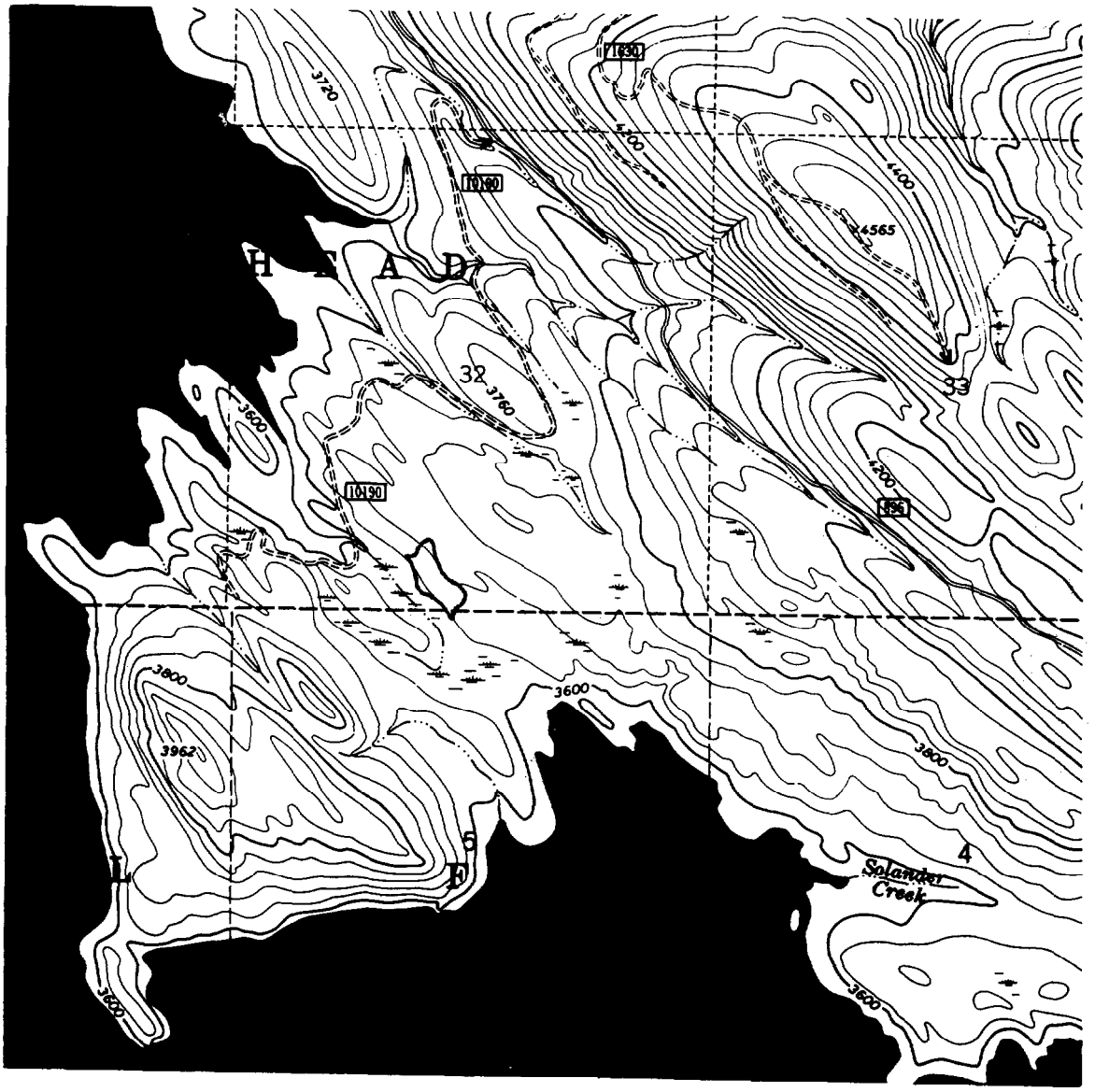
Task 1.19 Slash browse on 10 acres in the NE-l/4 Sec.32, T3ON,R18W (Site 09).



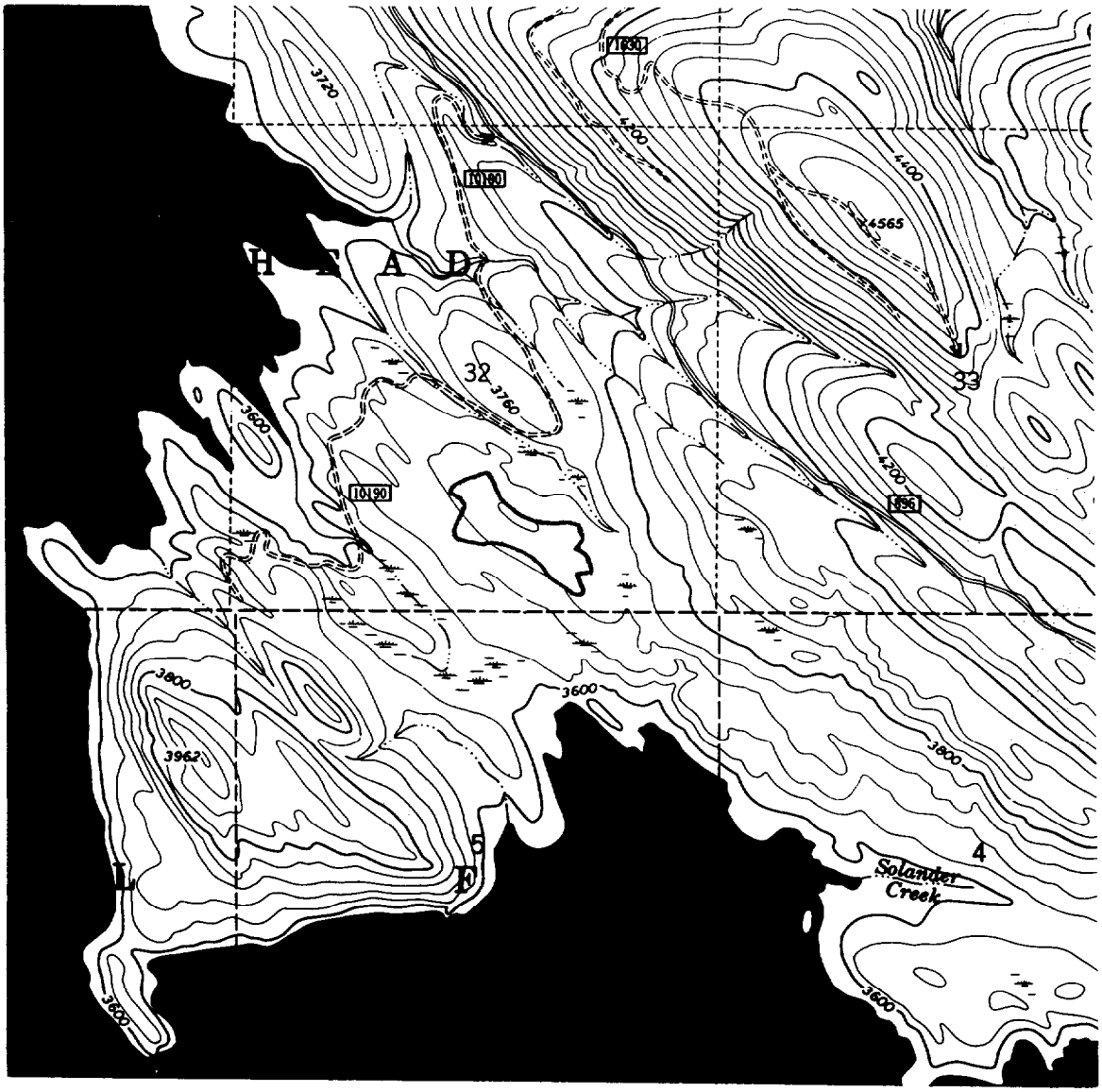
Task 1.20 Harvest (clearcut) 15 acres of sawlogs in the E-1/2 Sec.32,T30N,R18W (Site 10). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



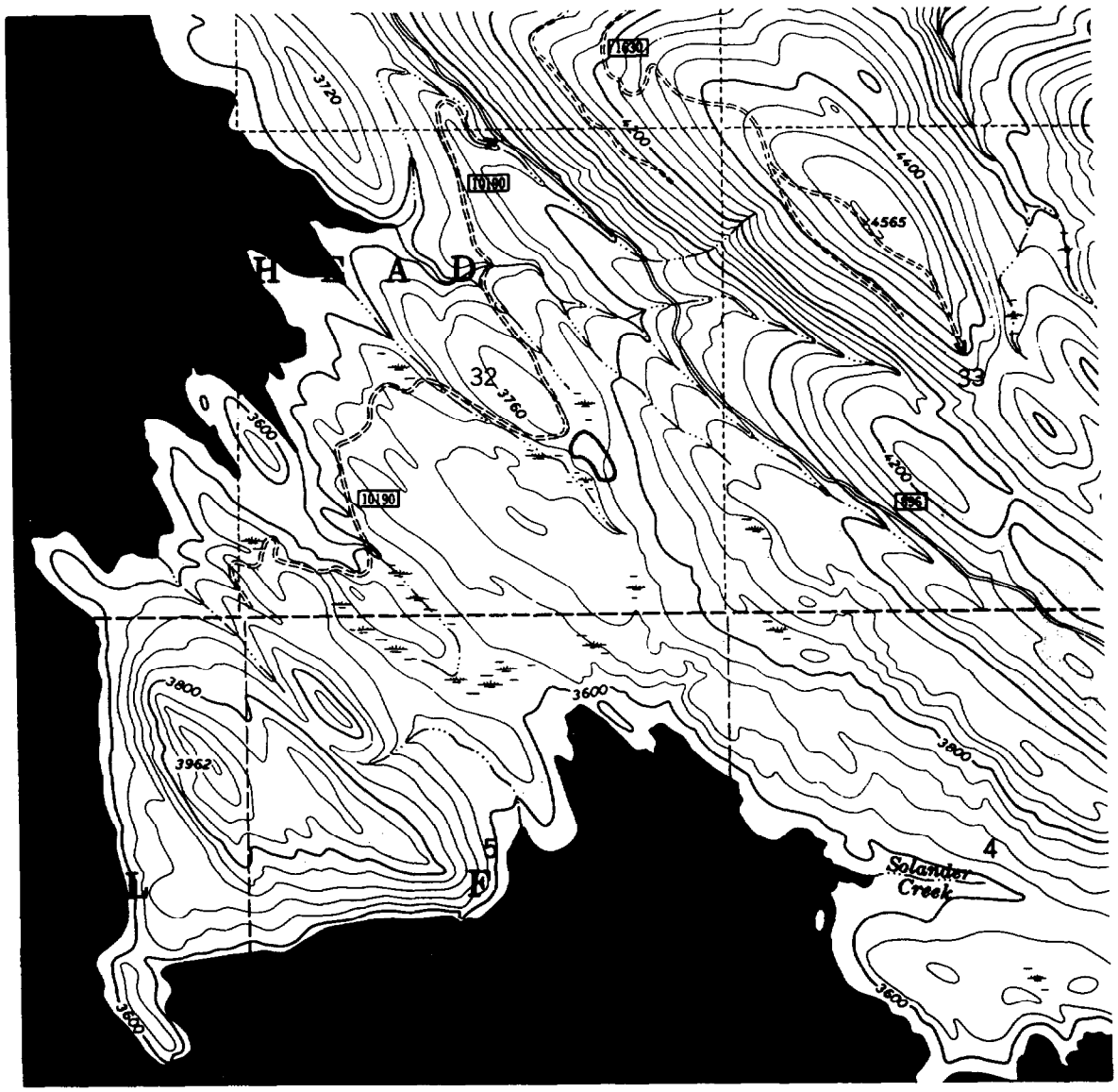
Task 1.21 Slash and broadcast burn (during spring) 20 acres of lodgepole pine in the SW-l/4 Sec. 5,T29N,R18W (Site 11).



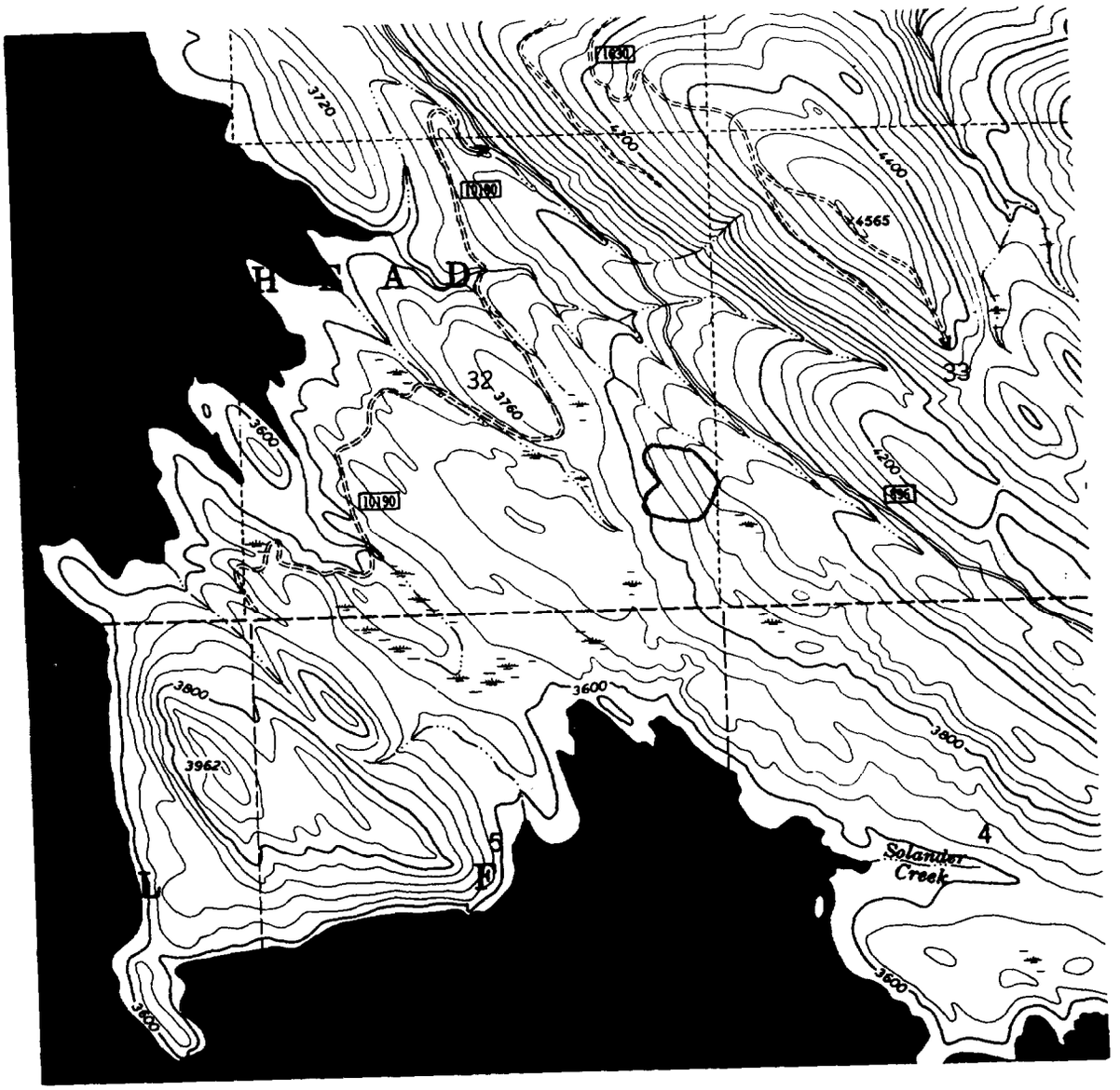
Task 1.22 Harvest (clearcut) 9 *acres* of *sawlogs* in the SW-l/4 Sec.32,T3ON,R18W (Site 12). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



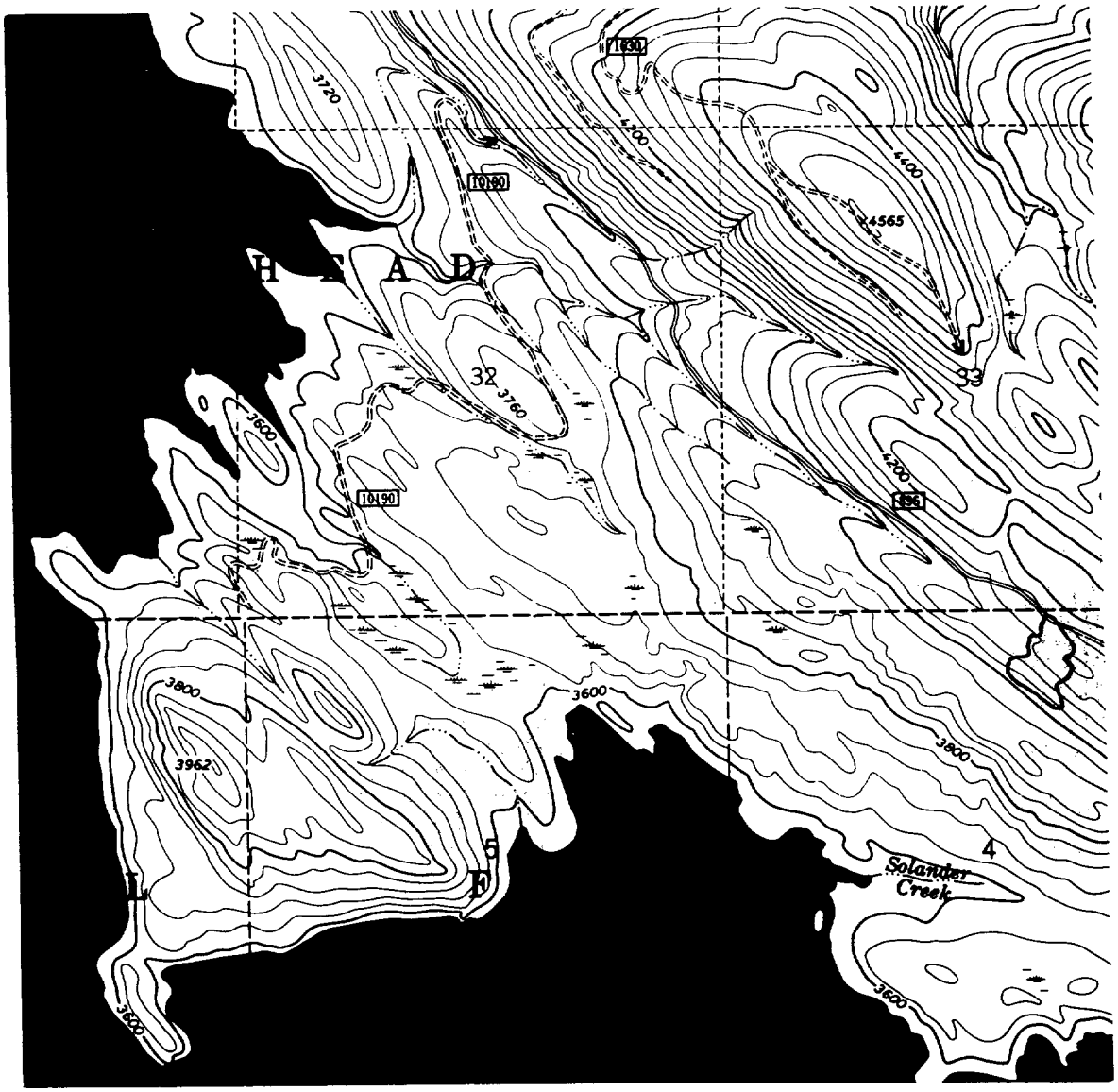
Task 1.23 Harvest (clearcut) 16 acres of sawlogs in the SE-l/4 Sec.32,T3ON,R18W (Site 14). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



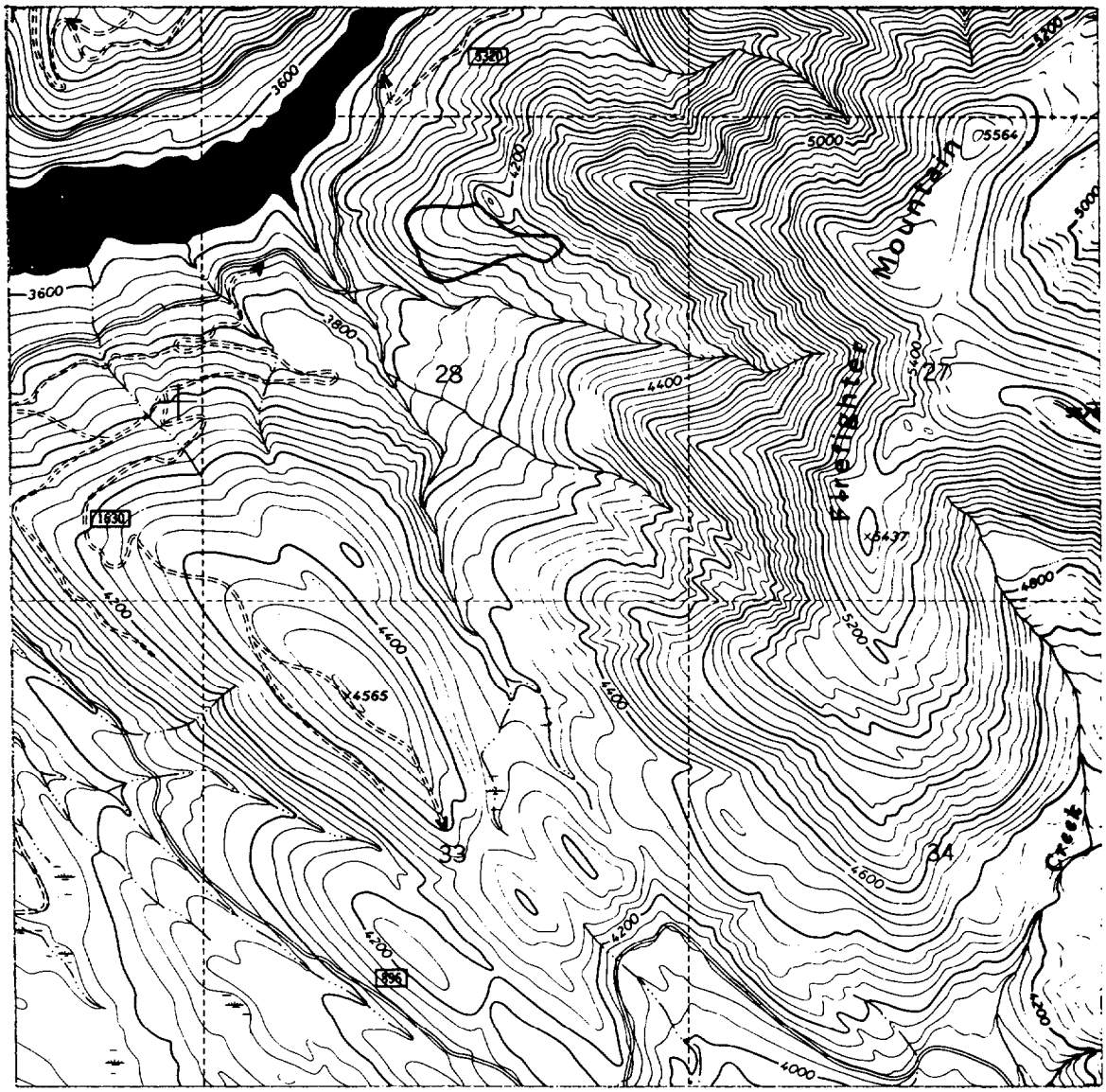
Task 1.24 Harvest (seed tree/clearcut) 10 acres of sawlogs in the SE-l/4 Sec.32,T3ON,R18W (Site 15). Conductunderburn during subsequent fall to remove residual slash. Partially plant with Douglas-fir.



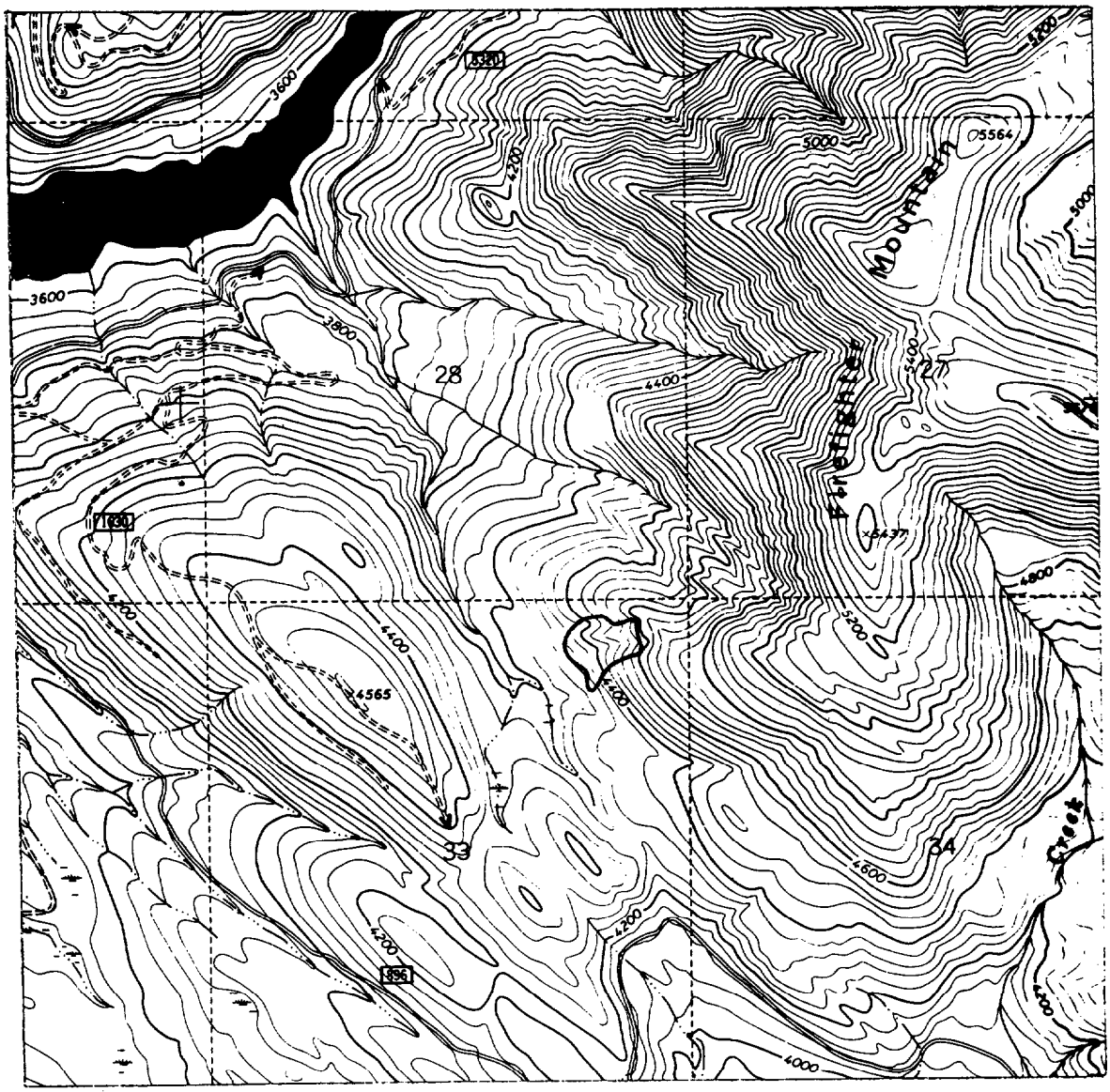
Task 1.25 Slash browse on 6 acres in the SE-l/4 Sec.32, T3ON,R18W (Site 16).



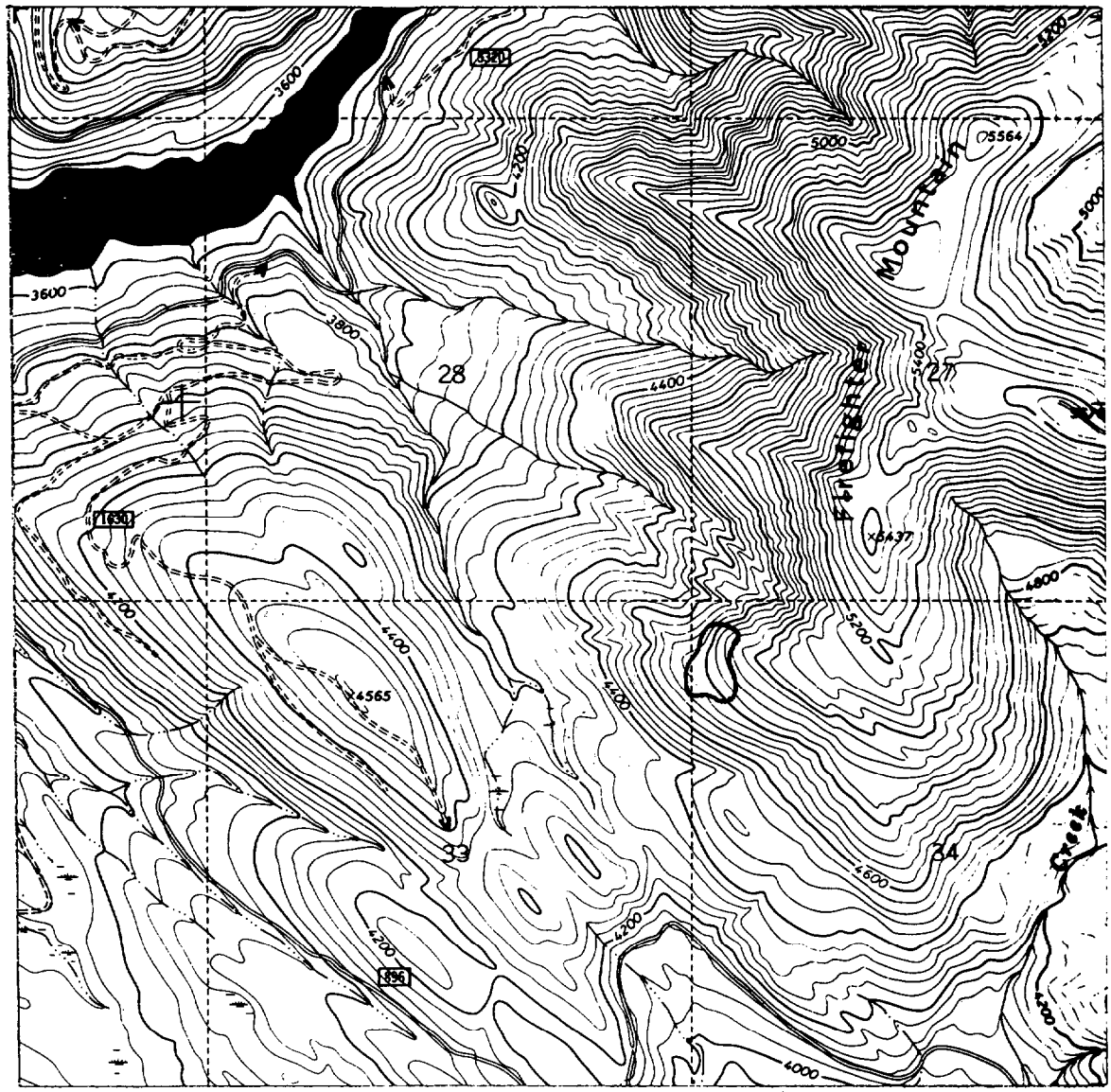
Task 1.26 Harvest (clearcut) 15 acres of sawlogs in the NE-l/4 Sec. 4, T29N, R18W (Site 17). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



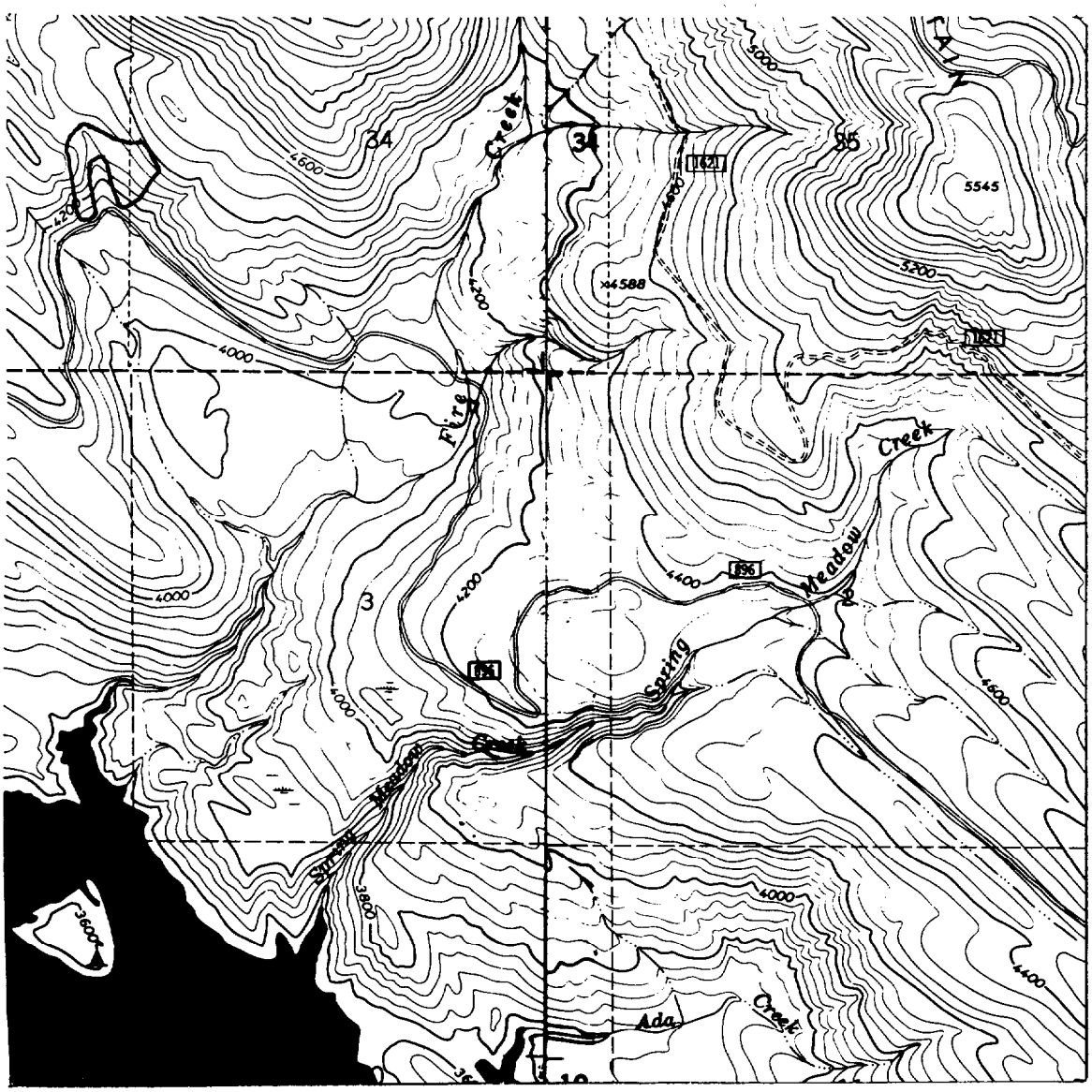
Task 1.27 Slash and broadcast burn (during fall) 20 acres of lodgepole pine in the NE-l/2 Sec.28,T30N,R18W (Site 18).



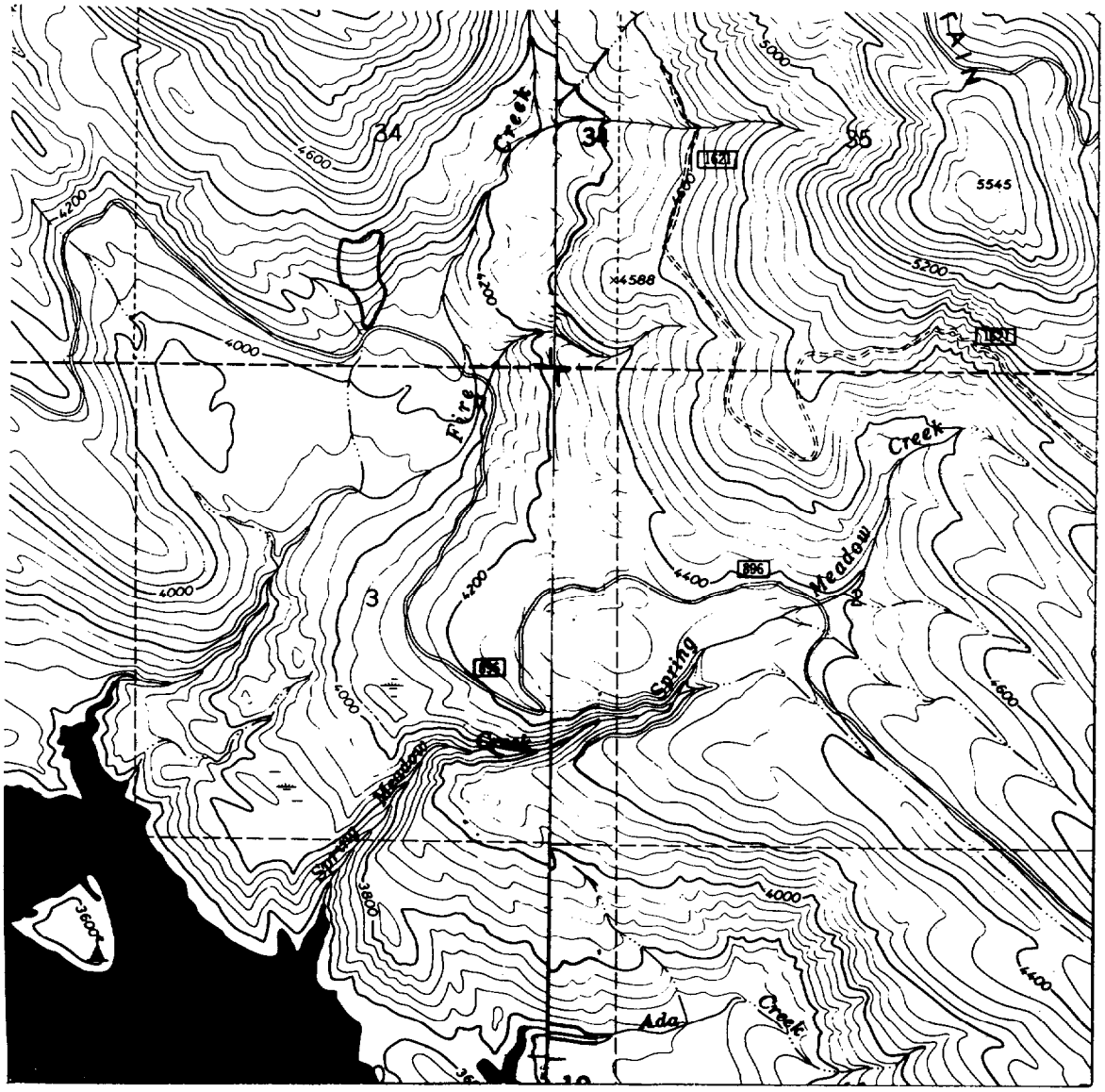
Task 1.28 Slash and broadcast burn (during fall) 12 acres of lodgepole pine in the NE-l/4 **Sec.33,T30N,R18W** (Site 21).



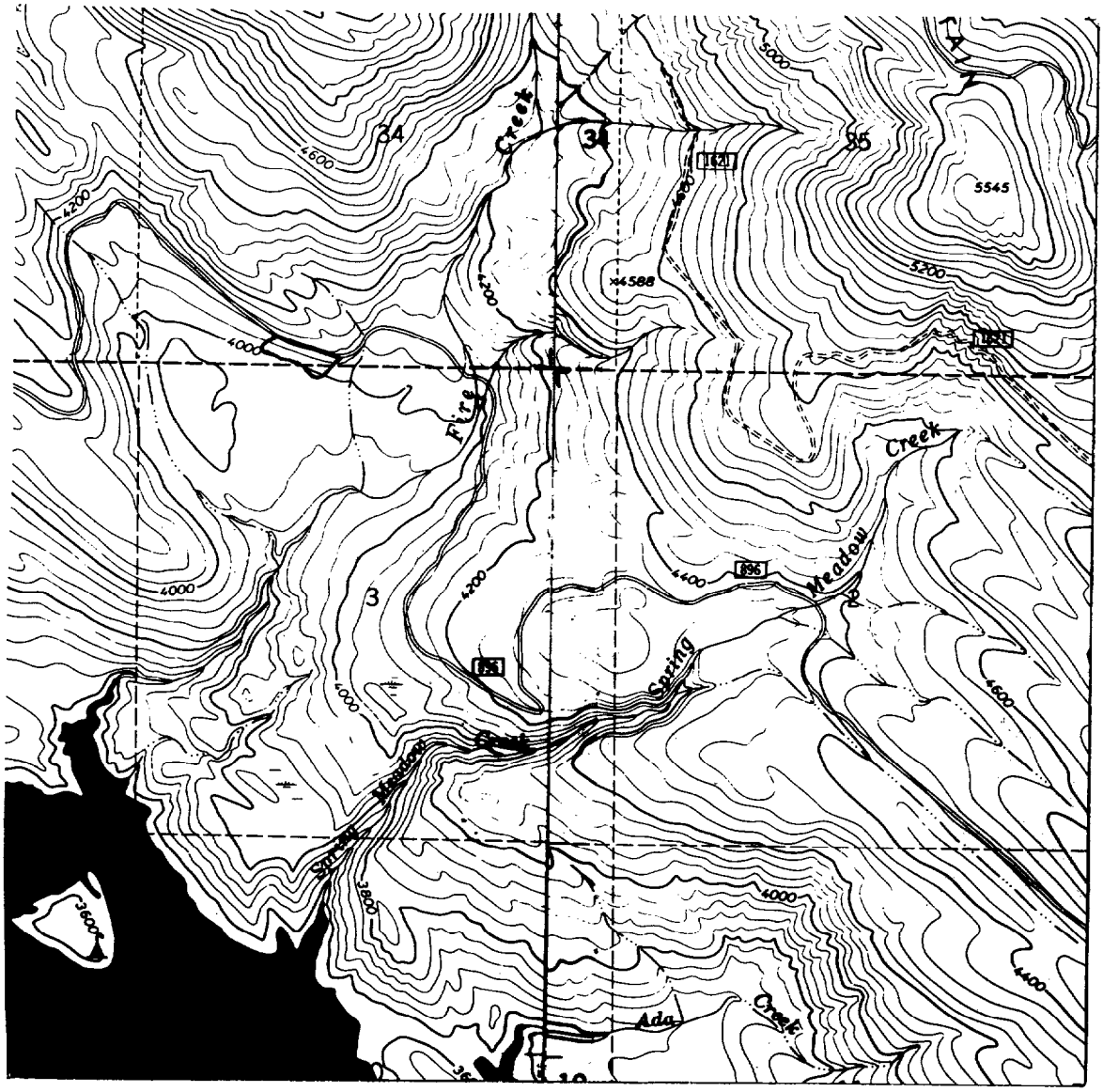
Task 1.29 Slash and broadcast burn (during fall) 14 acres of lodgepole pine in the NW-l/4 Sec.34,T3ON,R18W (Site 22).



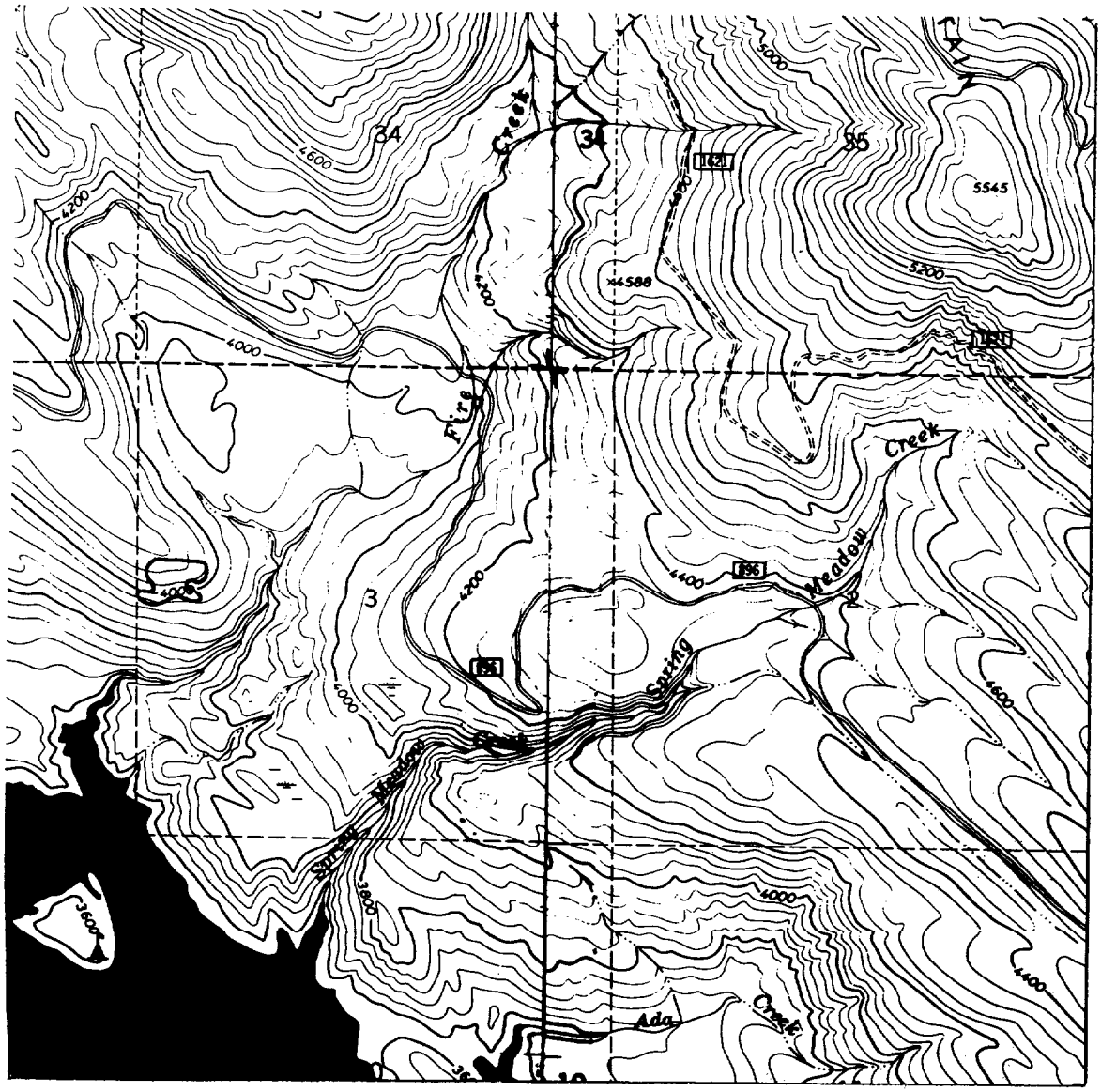
Task 1.30 Harvest (seed tree/shelterwood) 15 acres of **sawlogs** in the SE-l/4 Sec.33, and SW-l/4 Sec.34, T3ON,R18W (Site 23). Conduct underburn during subsequent fall to remove residual slash. Partially plant with Douglas-fir.



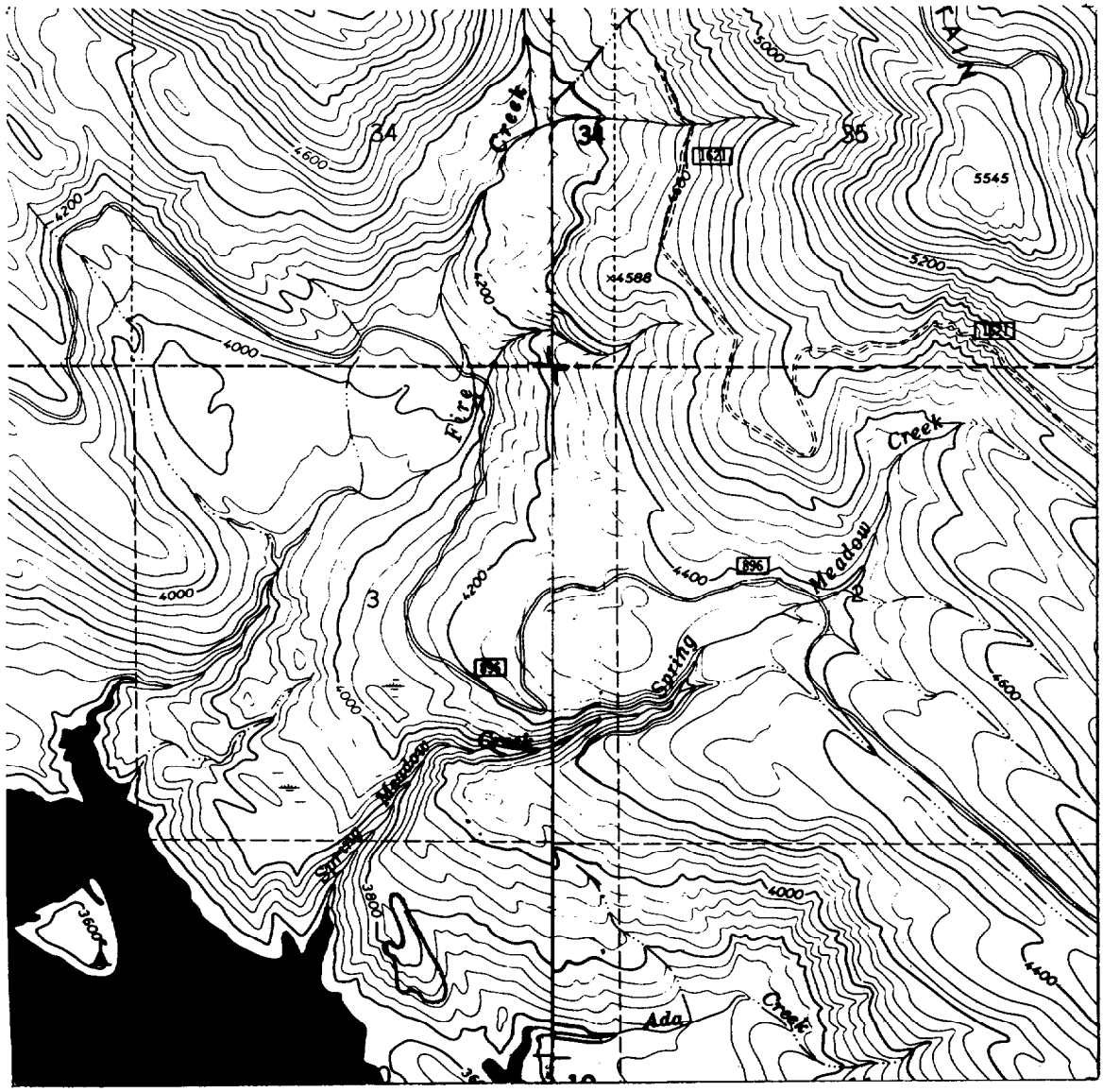
Task 1.31 Harvest (clearcut) 10 acres of stakes and posts, in the S-1/2 Sec.34,T30N,R18W (Site 24). Broadcast burn residual slash during subsequent fall.



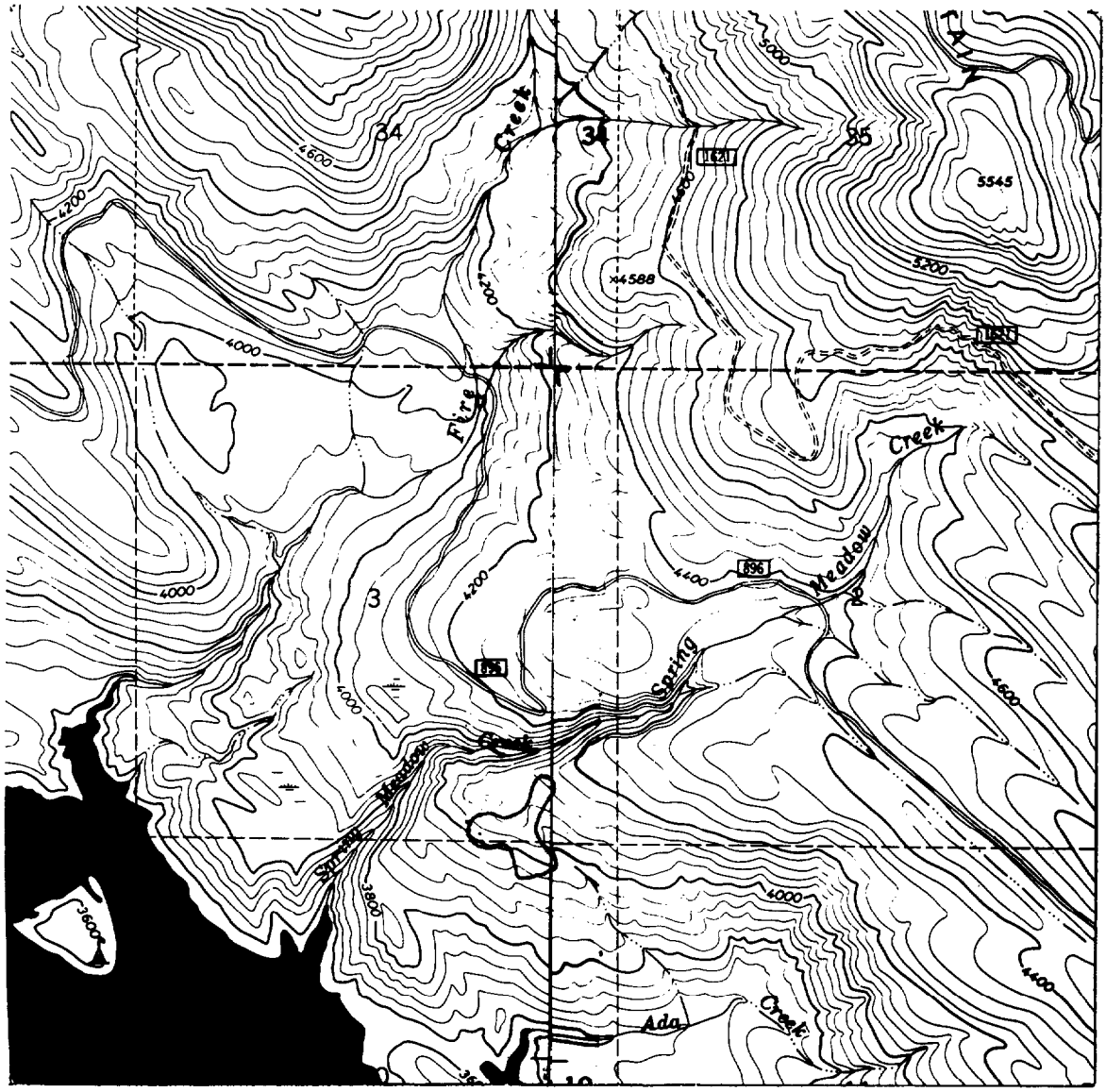
Task 1.32 Harvest (clearcut) 7 acres of stakes and posts in the SW-1/4 Sec.34,T30N,R18W, and NW-l/4 Sec. 3, T29N,R18W (Site 25). Broadcast burn residual slash during subsequent fall.



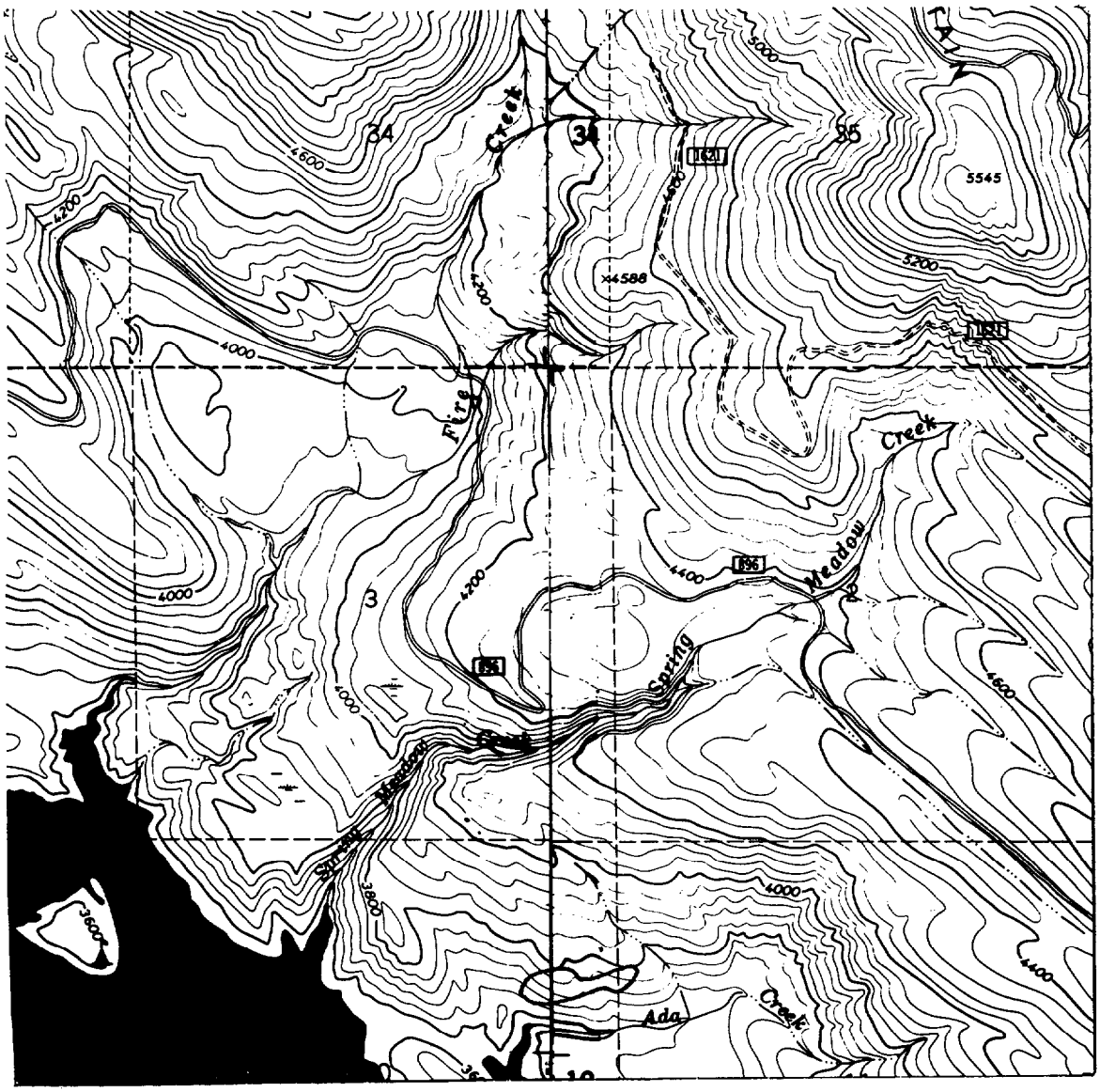
Task 1.33 Harvest (clearcut) 12 acres of stakes and posts in the W-1/2 Sec. 3,T29N,R18W (Site 26). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



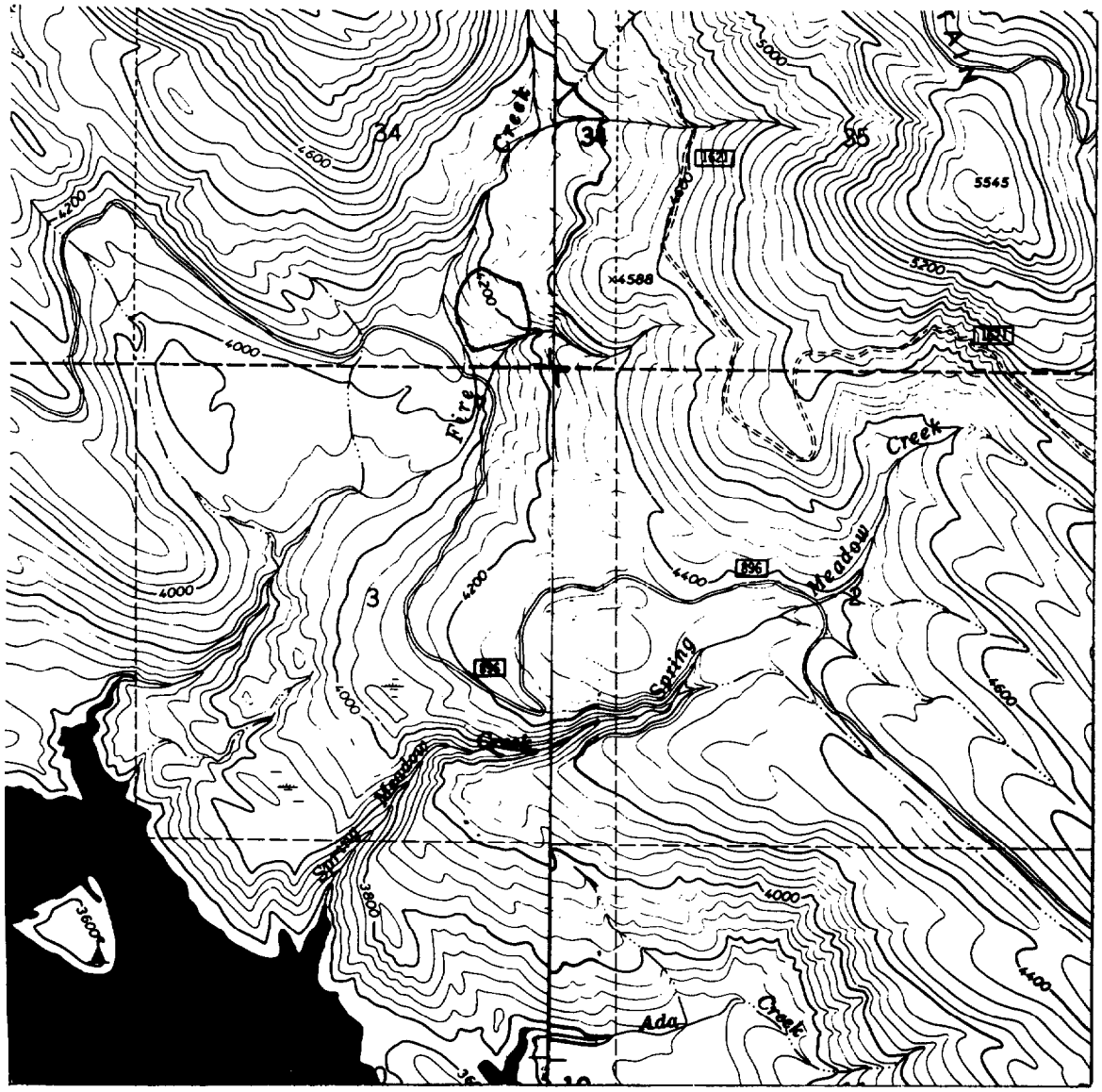
Task 1.34 Slash and broadcast burn (during fall) 10 acres of lodgepole pine in the NE-1/4 Sec.10,T29N,R18W (Site 27).



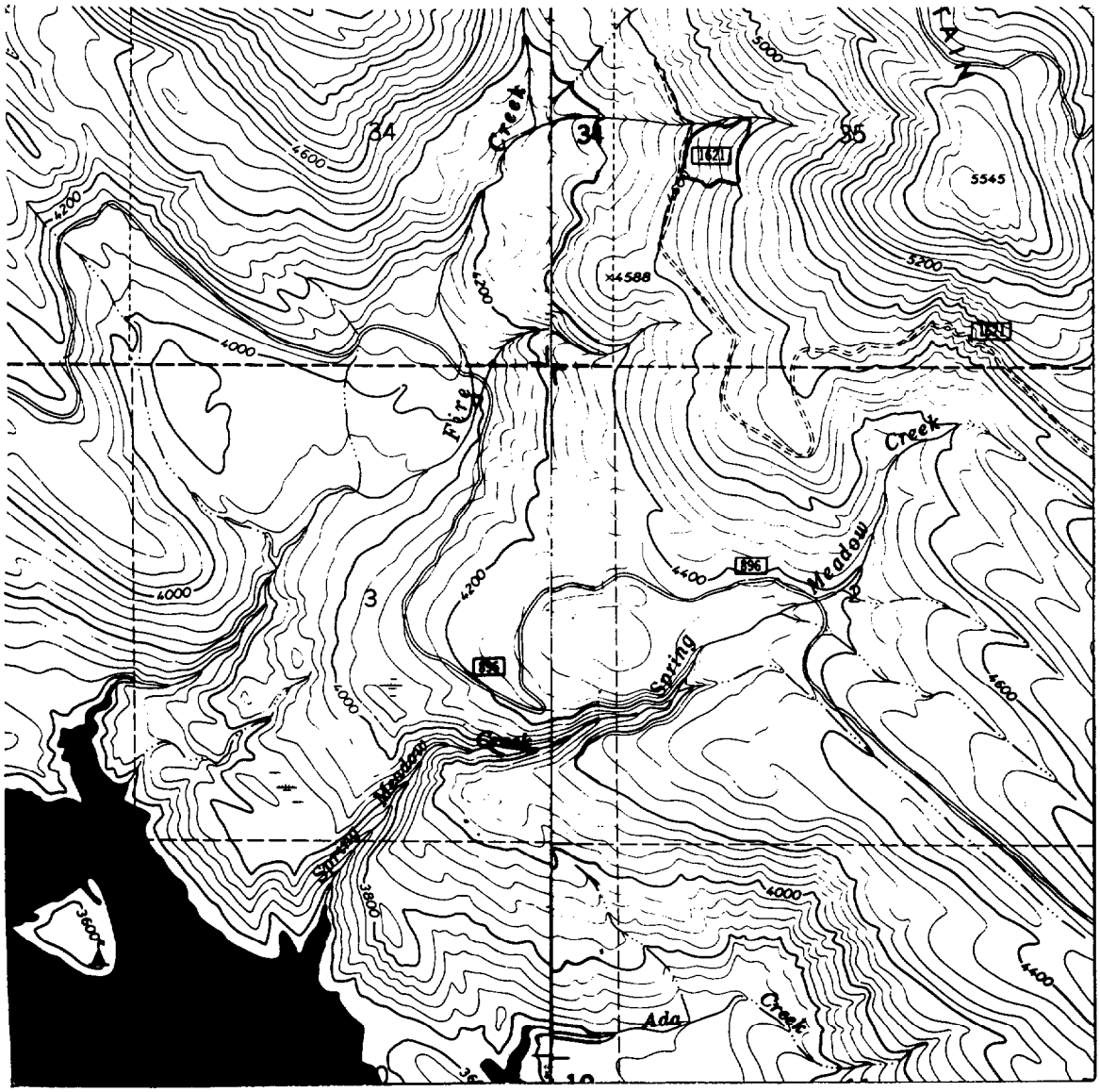
Task 1.35 Harvest (clearcut) 15 acres of sawlogs in the SE-l/4 Sec. 3, and NE-1/4 Sec.10,T29N,R18W (Site 28). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



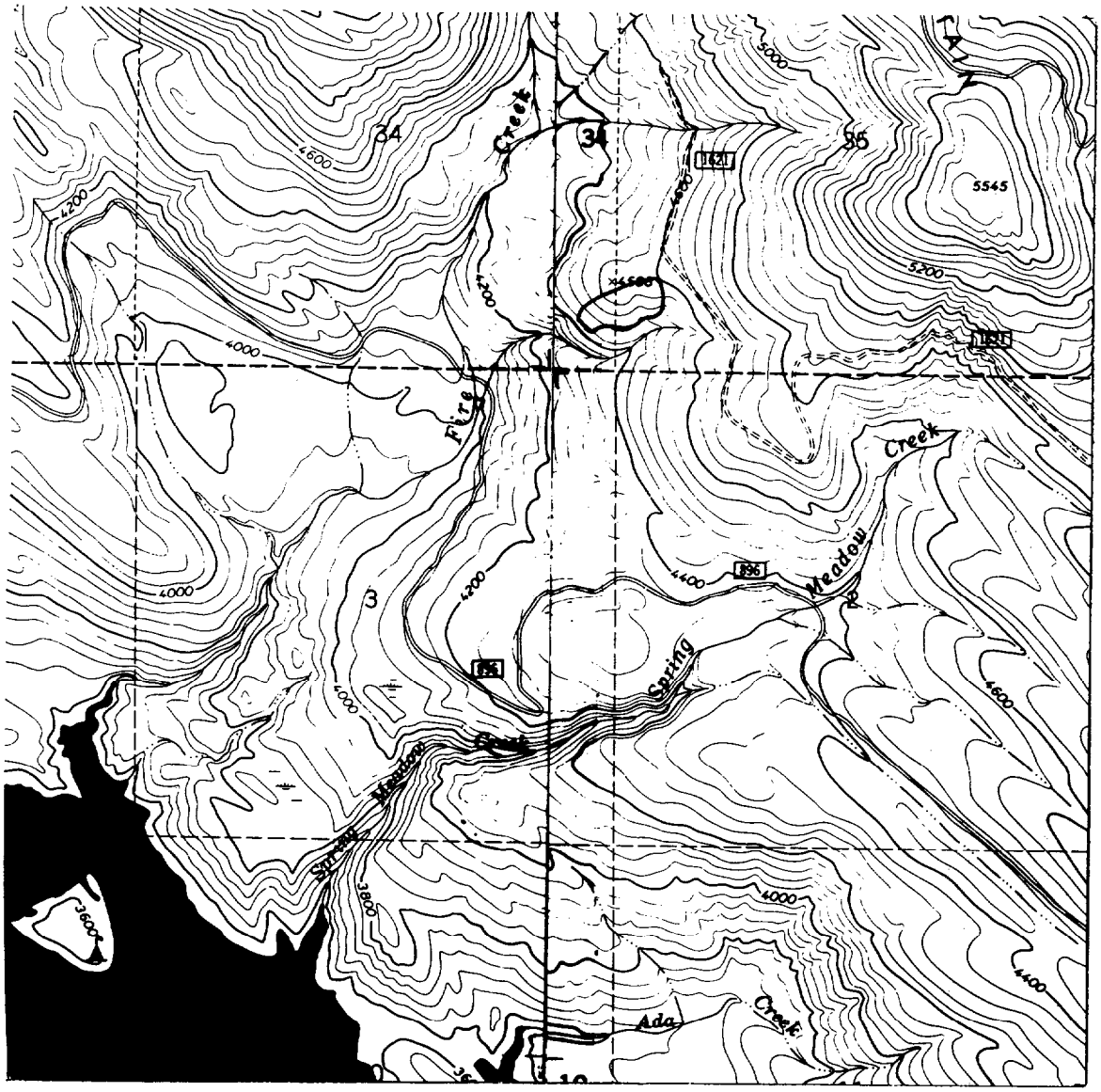
Task 1.36 Slash and broadcast burn (during fall) 10 acres of lodgepole pine in the NE-1/4 Sec.10, and NW-l/4 Sec.11,T29N, R18W (Site 29).



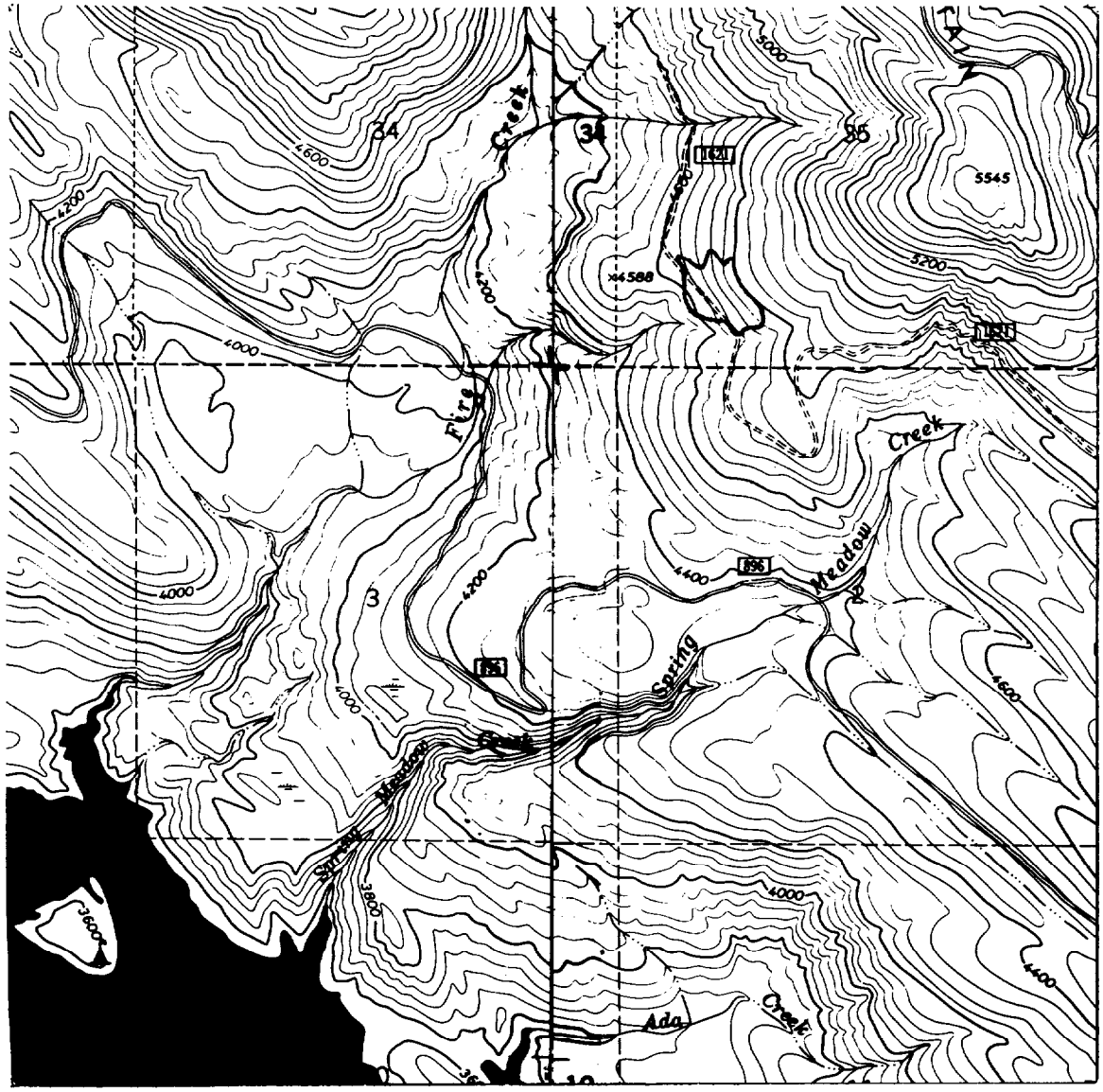
Task 1.37 Slash browse on 20 acres in the SE-l/4 Sec.34, T3ON,R18W (Site 31).



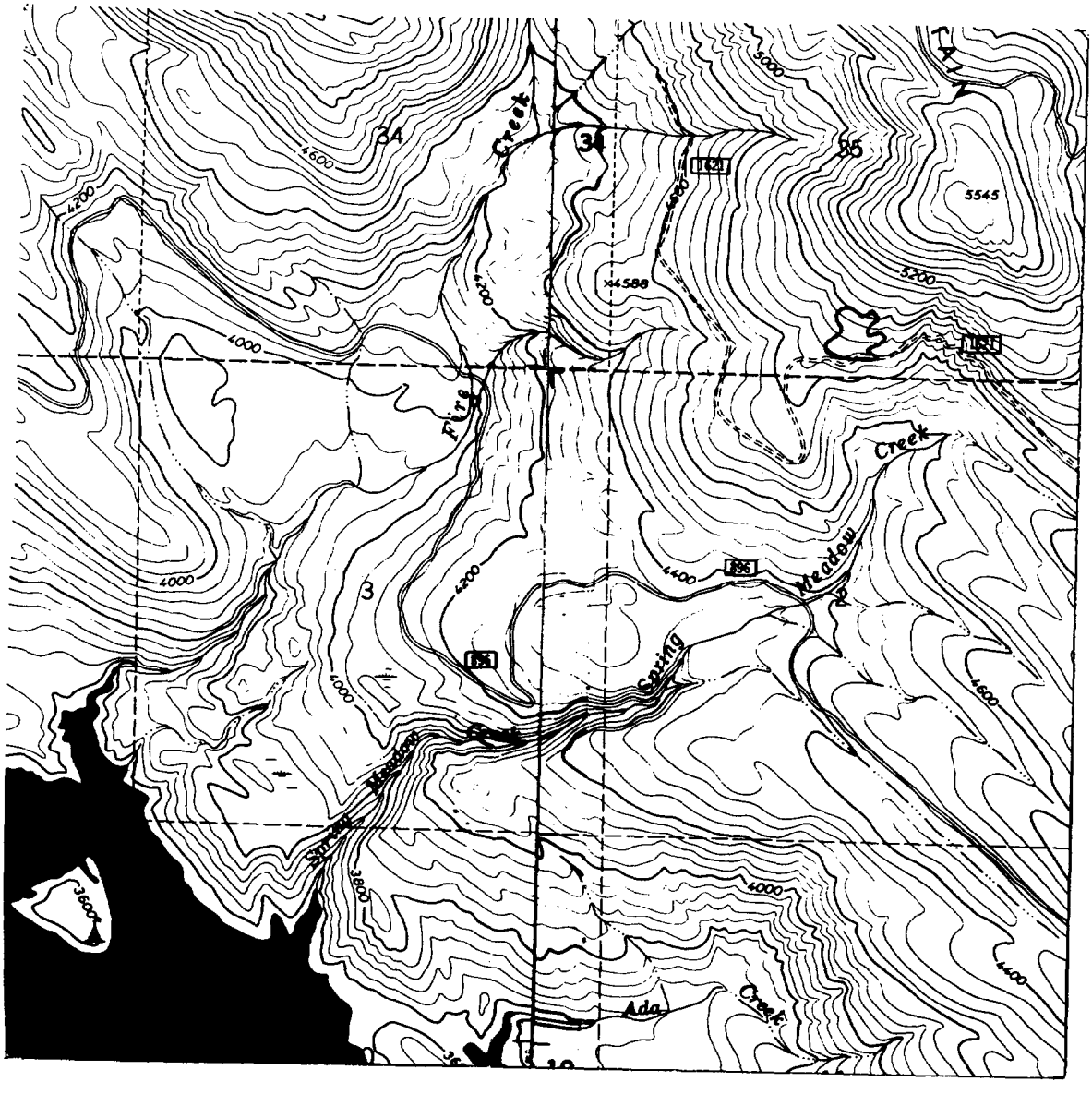
Task 1.38 Slash browse on 10 acres in the SW-l/4 Sec.35,T3ON,R18W (Site 33).



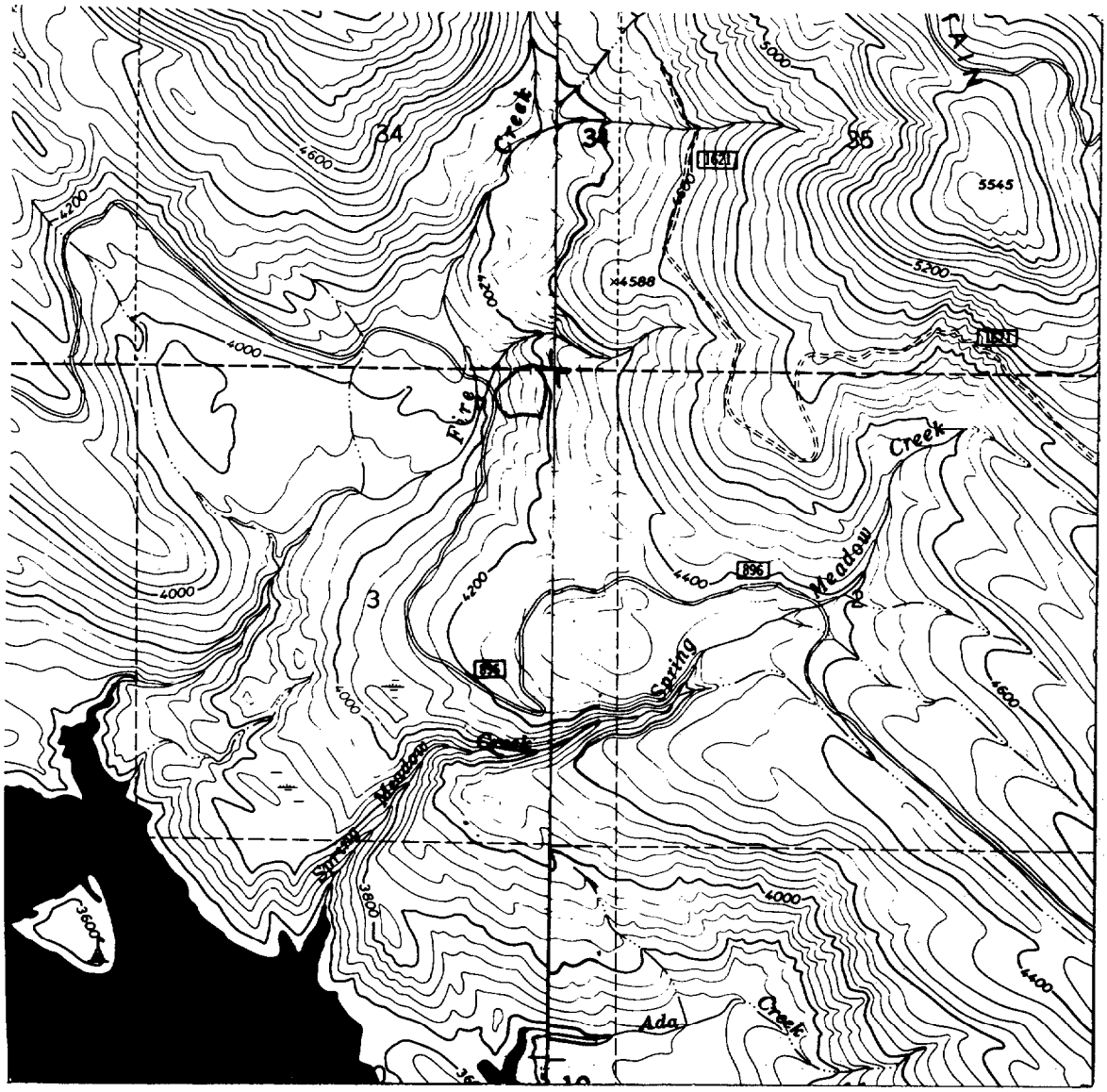
Task 1.39 Harvest (clearcut) 9 acres of sawlogs in the SW-l/4 Sec.35,T30N,R18W (Site 34). Broadcast burn residual slash during subsequent fall.



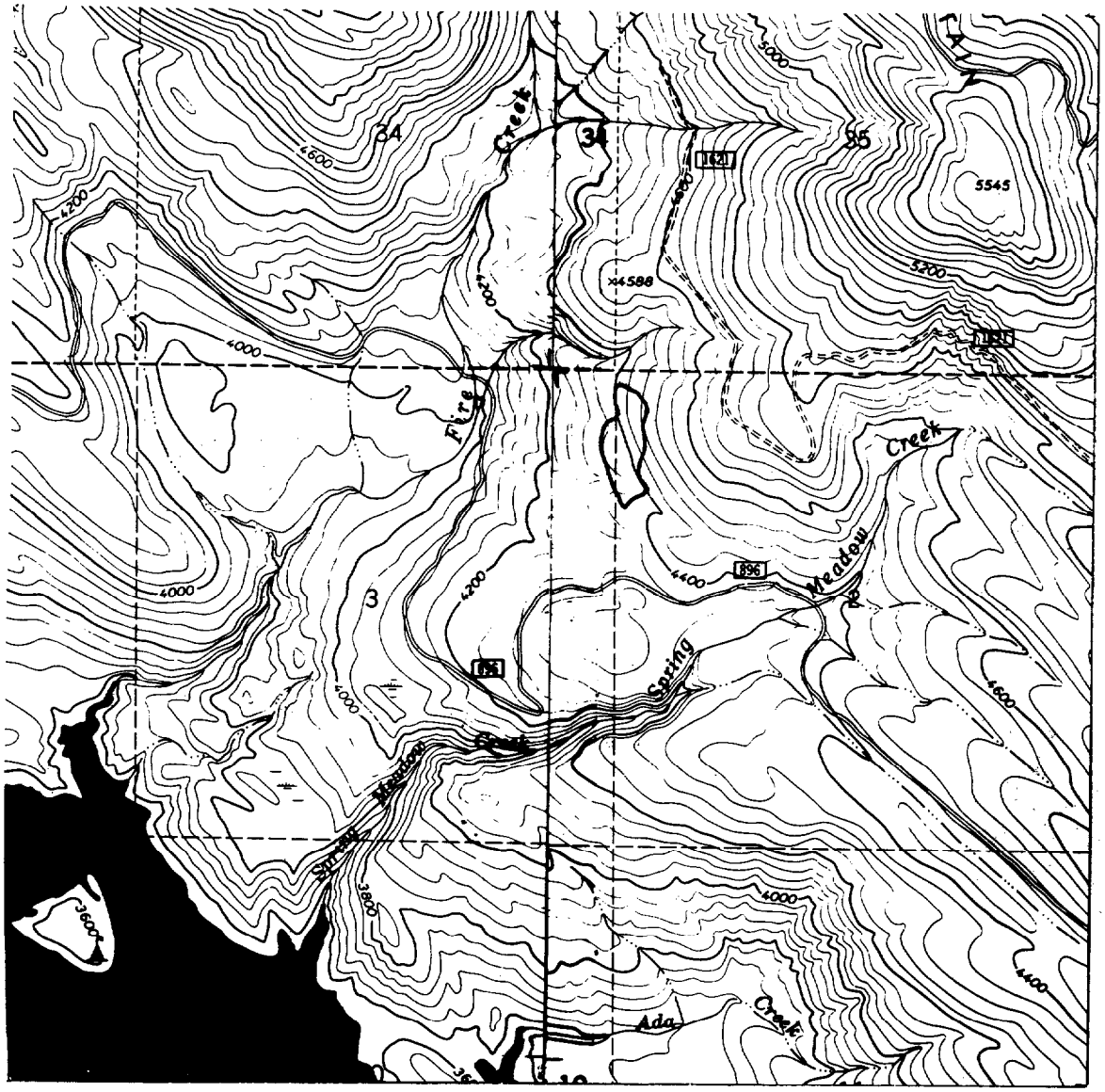
Task 1.40 Slash browse on 10 acres in the SW-l/4 Sec.35, T3ON,R18W (Site 35).



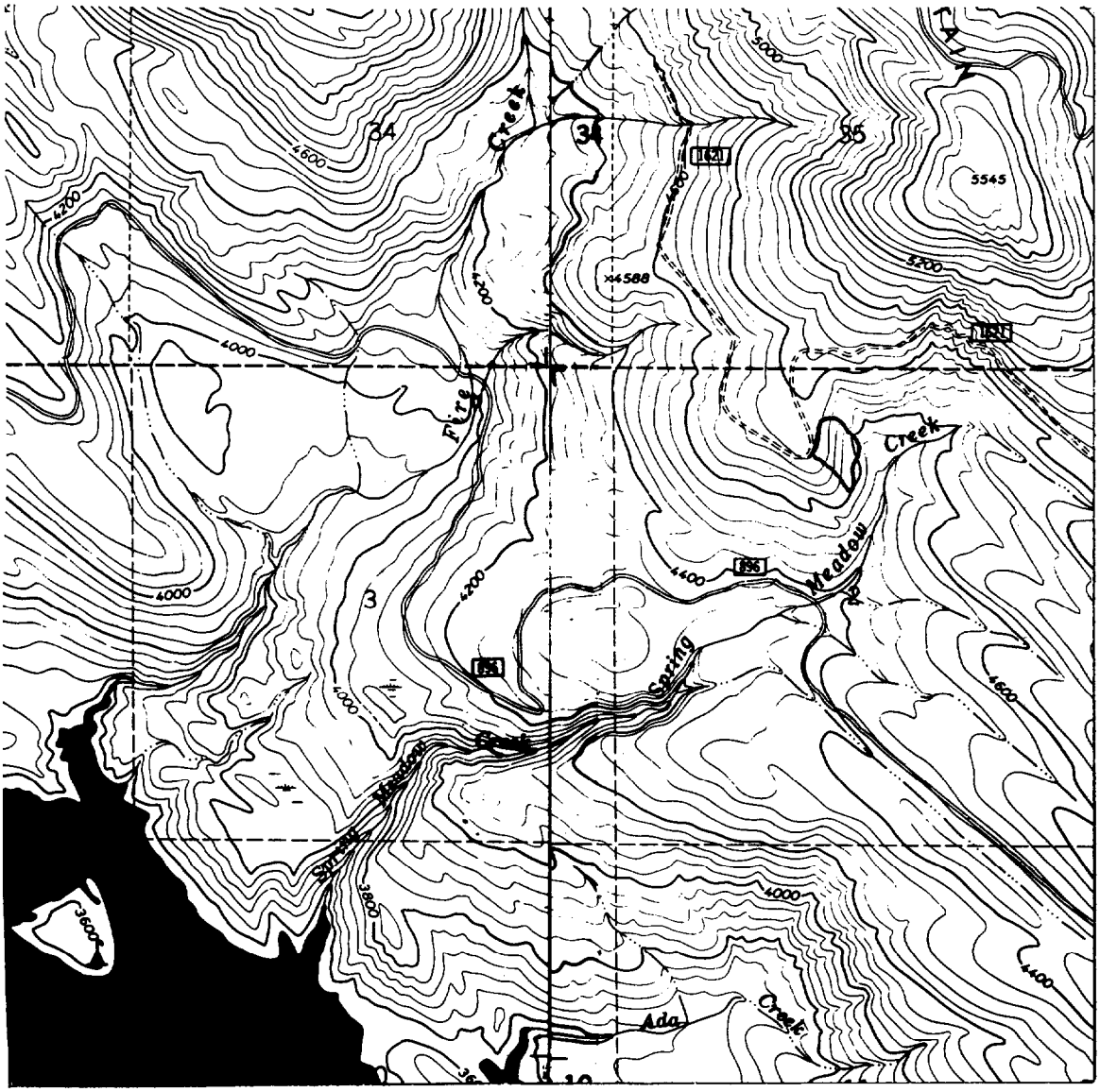
Task 1.41 Harvest (clearcut) 7 acres of sawlogs in the S-1/2 Sec.35,T30N R18W (Site 36). Broadcast burn residual slash during subsequent fill.



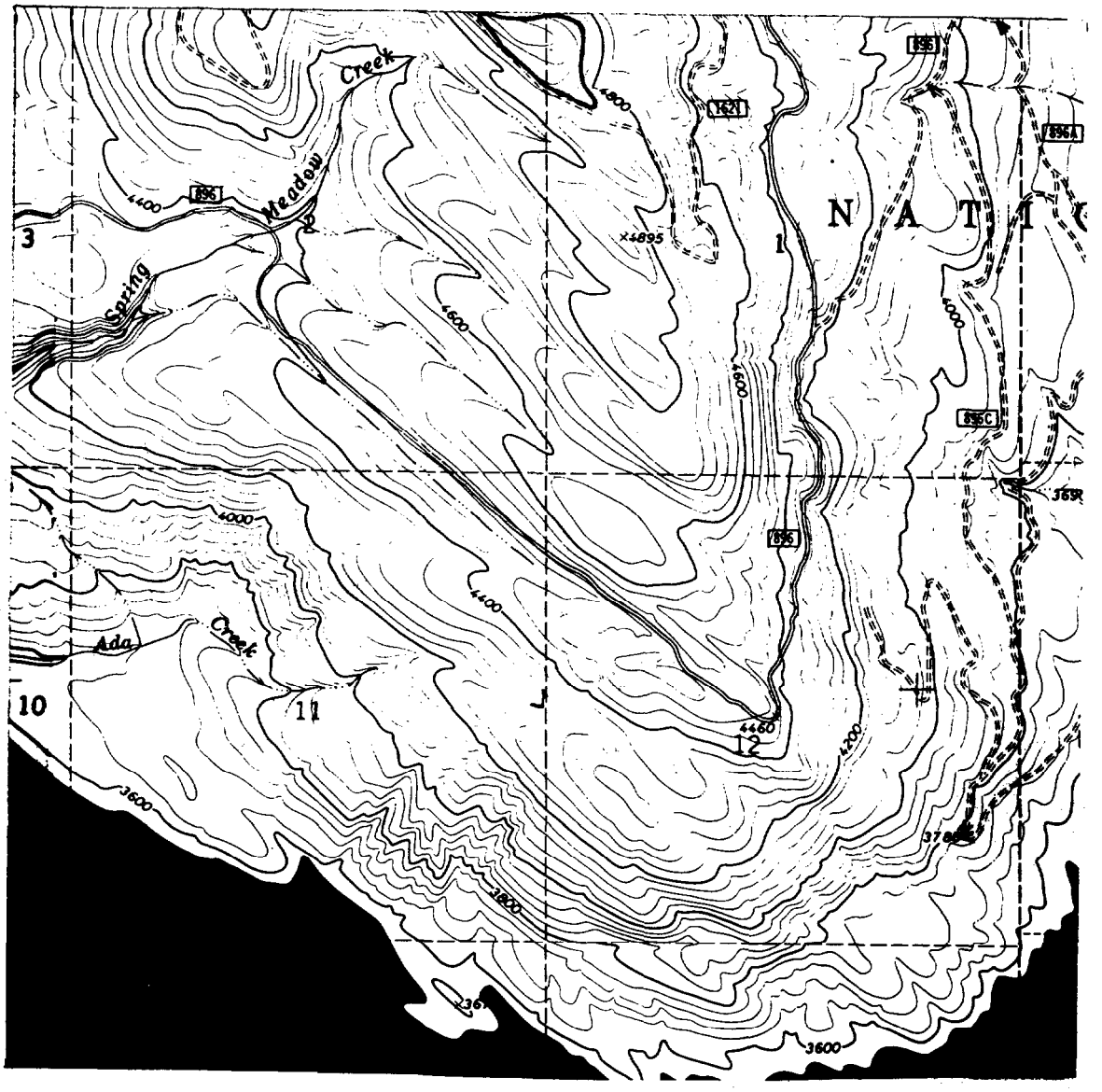
Task 1.42 Slash browse on 6 acres in the NE-l/4 Sec. 3, T29N,R18W (Site 37).



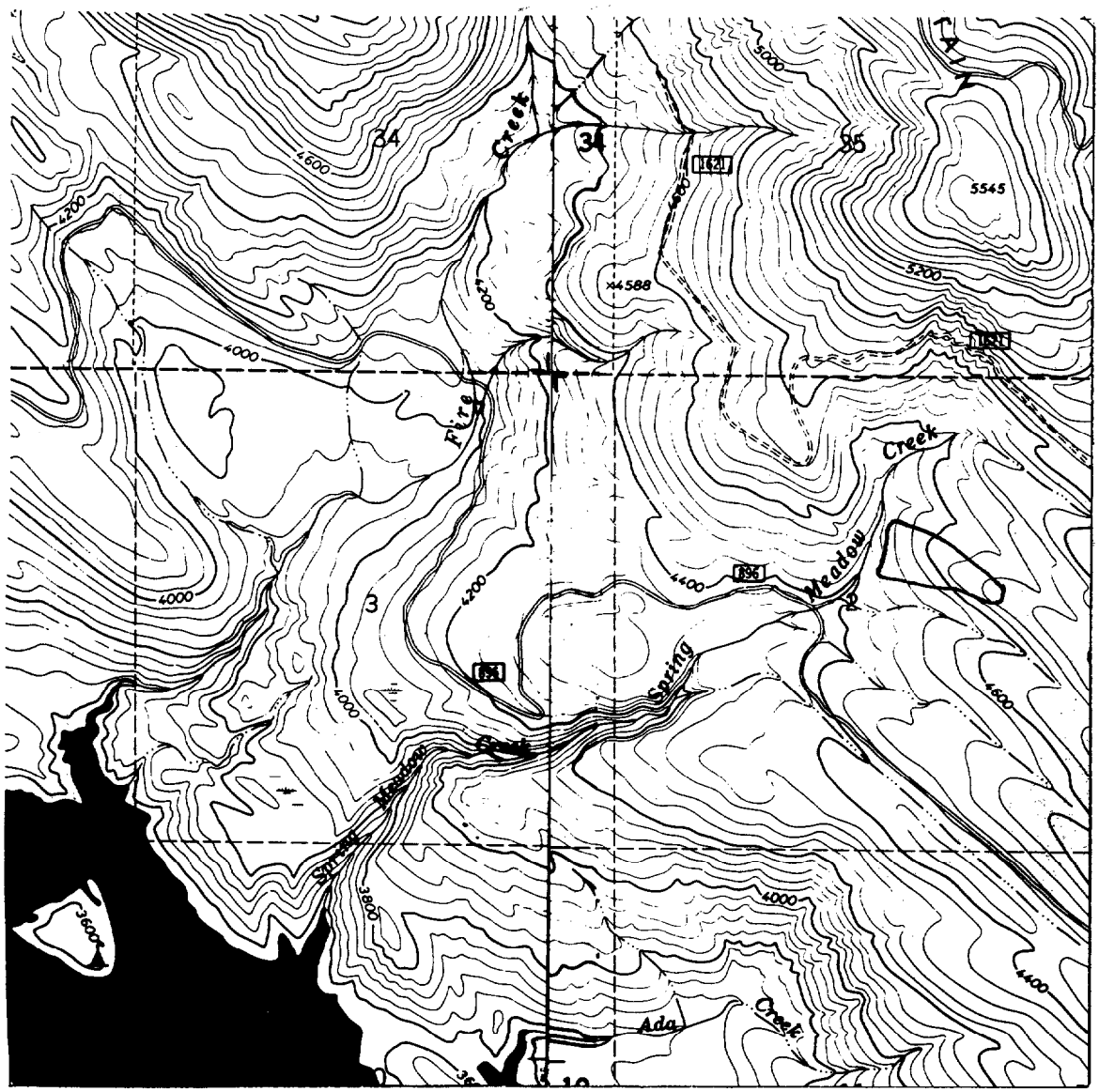
Task 1.43 Harvest (clearcut) 16 acres of sawlogs in the NE-l/4 Sec. 3, and NW-1/4 Sec. 2,T29N,R18W (Site 38). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



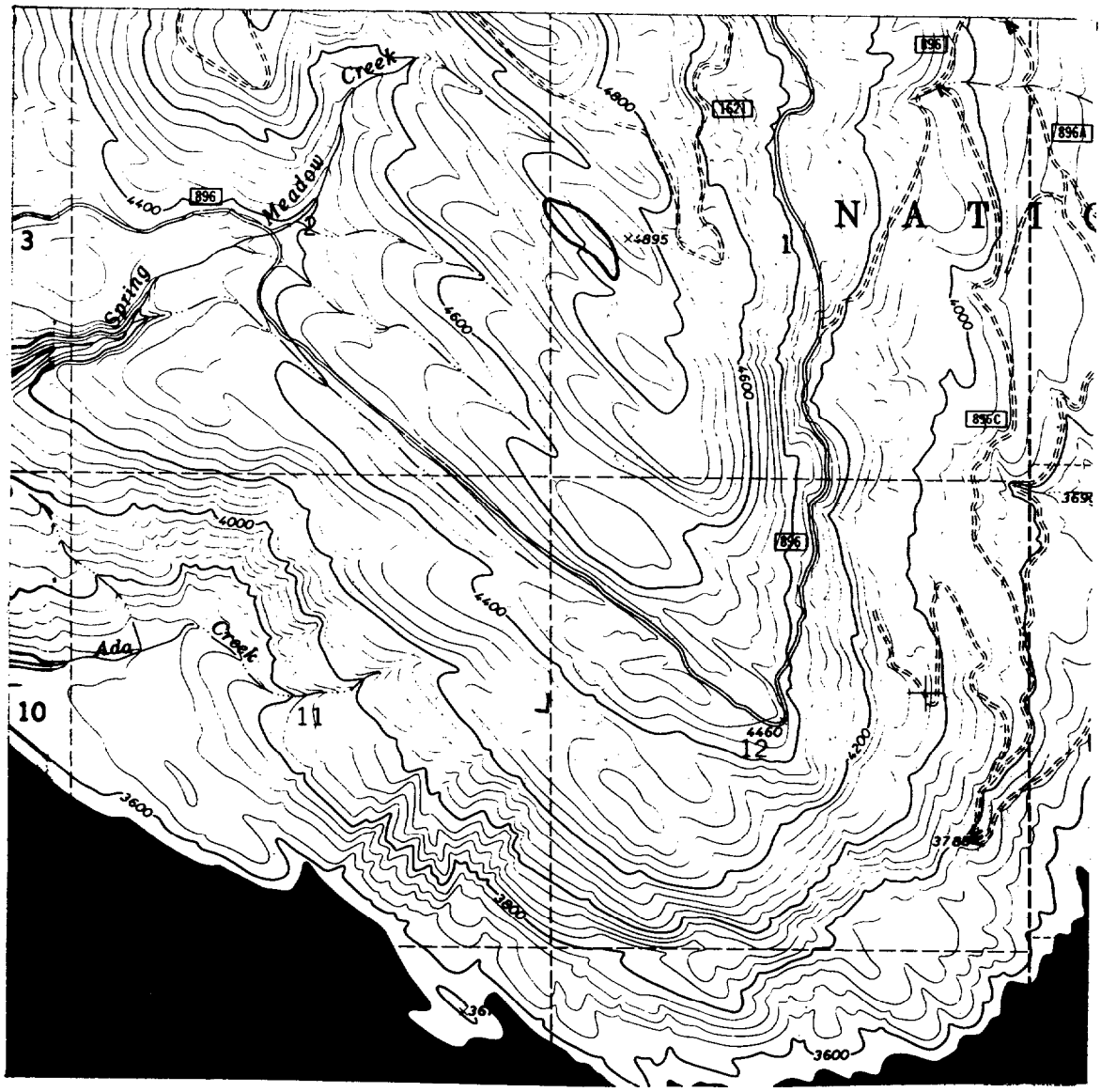
Task 1.44 Harvest (clearcut) 10 acres of **sawlogs** in the N-1/2 Sec. 2,T29N,R18W (Site 39). Broadcast burn residual slash during subsequent fall.



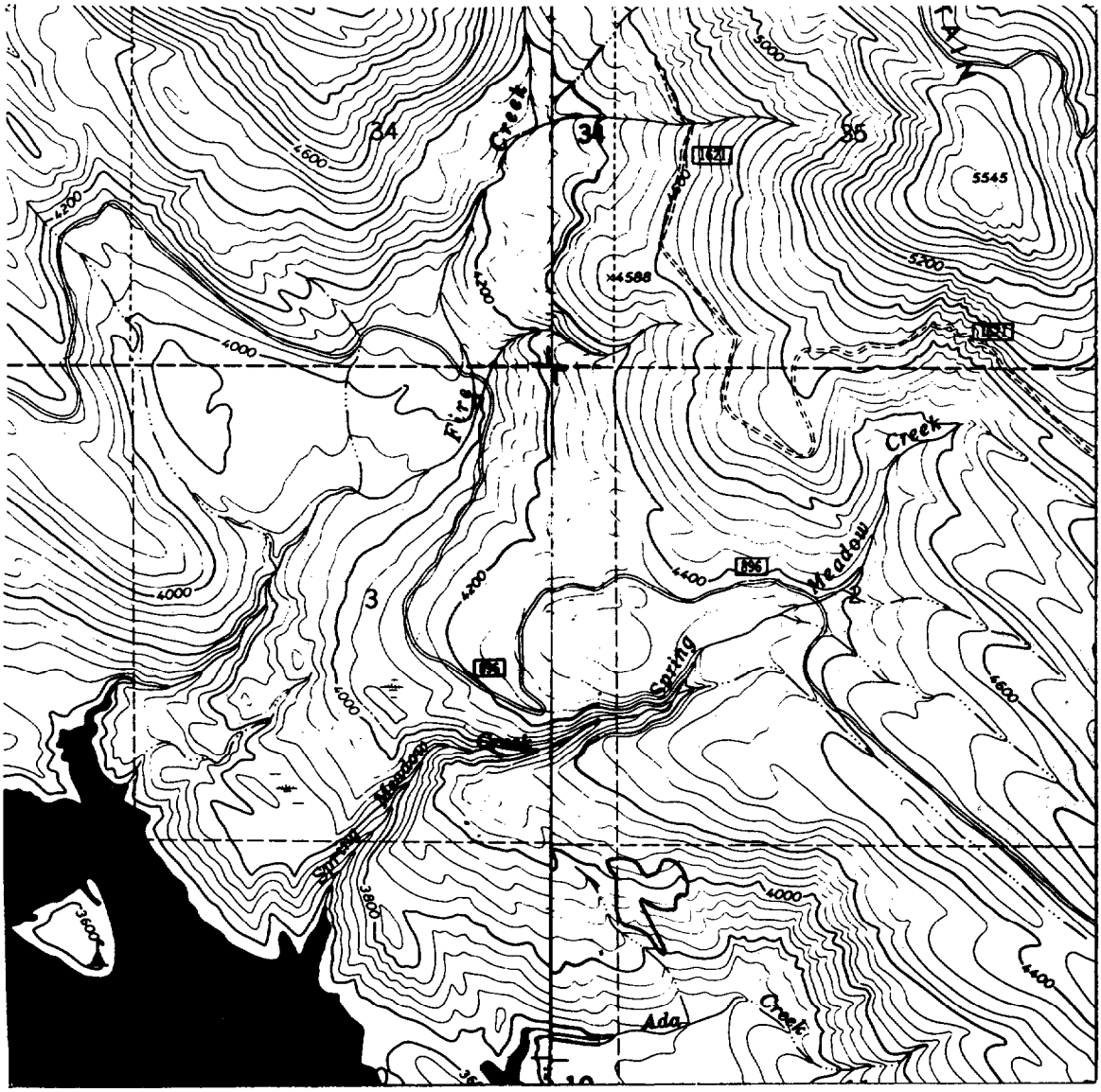
Task 1.45 Harvest (clearcut) 14 acres of stakes and posts in the NE-l/4 Sec. 2, and NW-l/4 Sec. 1,T29N,R18W (Site 42). Broadcast burn residual slash during subsequent fall.



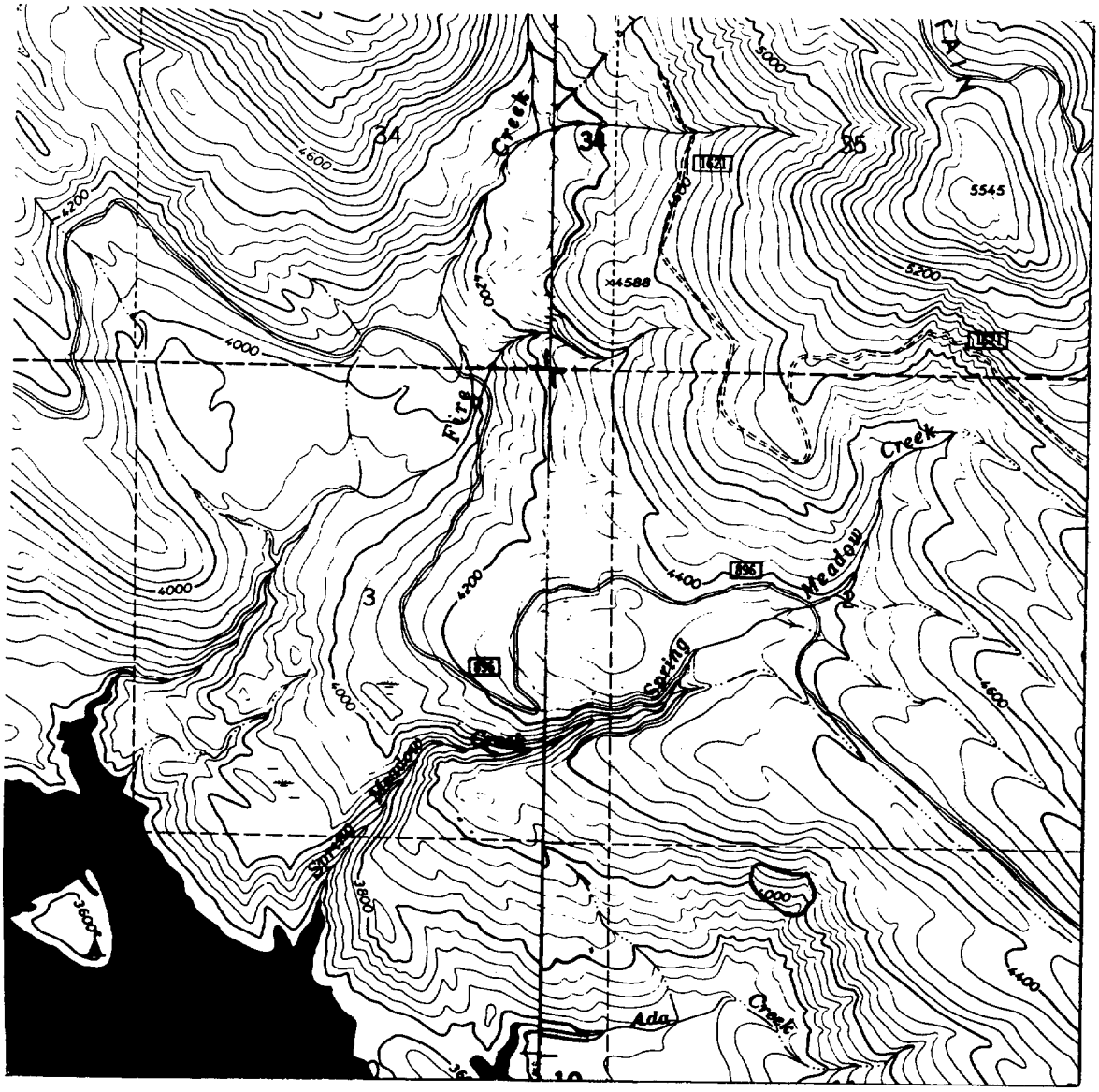
Task 1.46 Harvest (clearcut) 20 acres of sawlogs in the NE-l/4 Sec. 2,T29N,R18W (Site 44). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



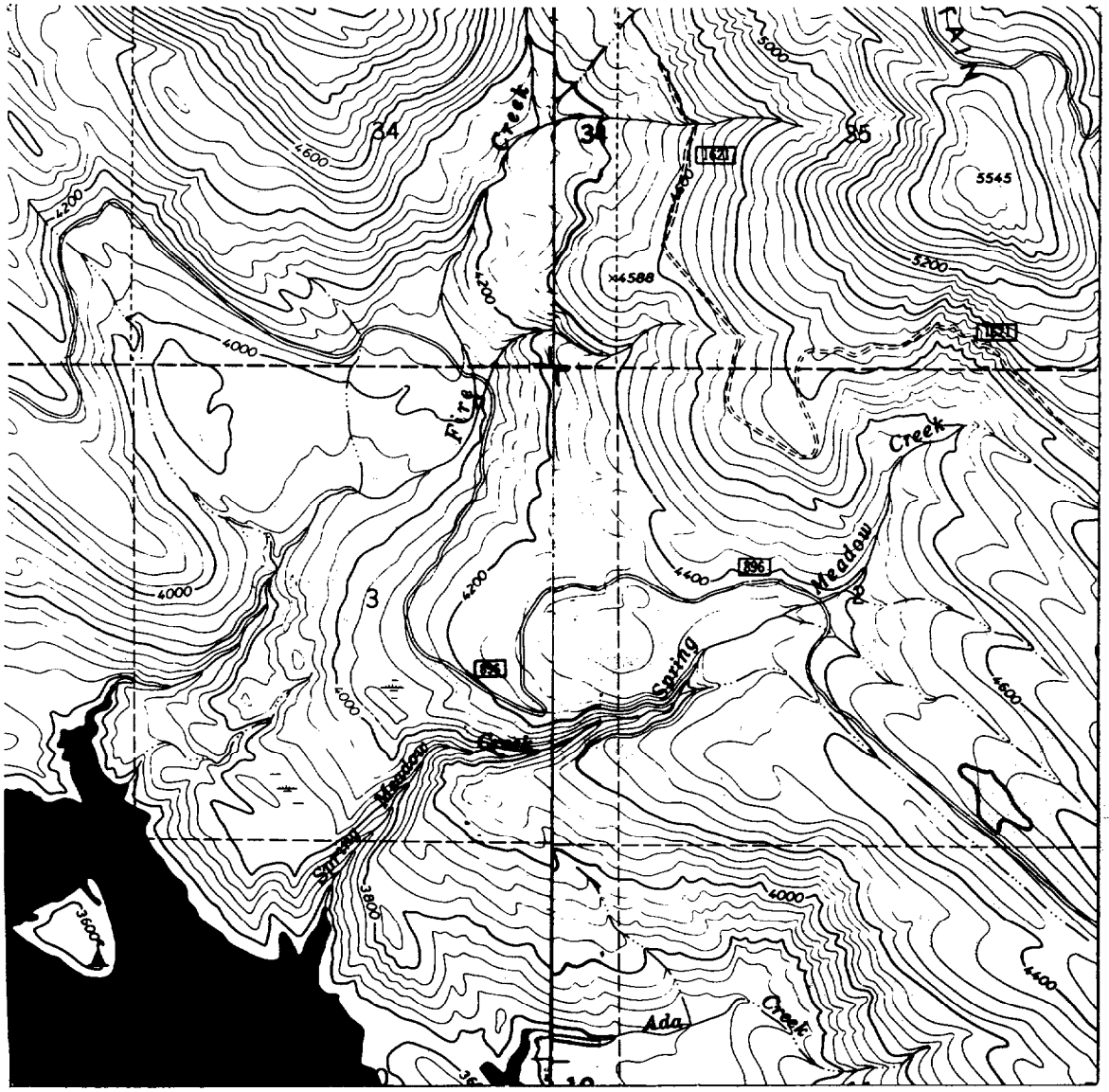
Task 1.47 Harvest (clearcut) 20 acres of stakes and posts in the E-l/2 Sec. 2, and W-l/2 Sec. 1,T29N,R18W (Site 47). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



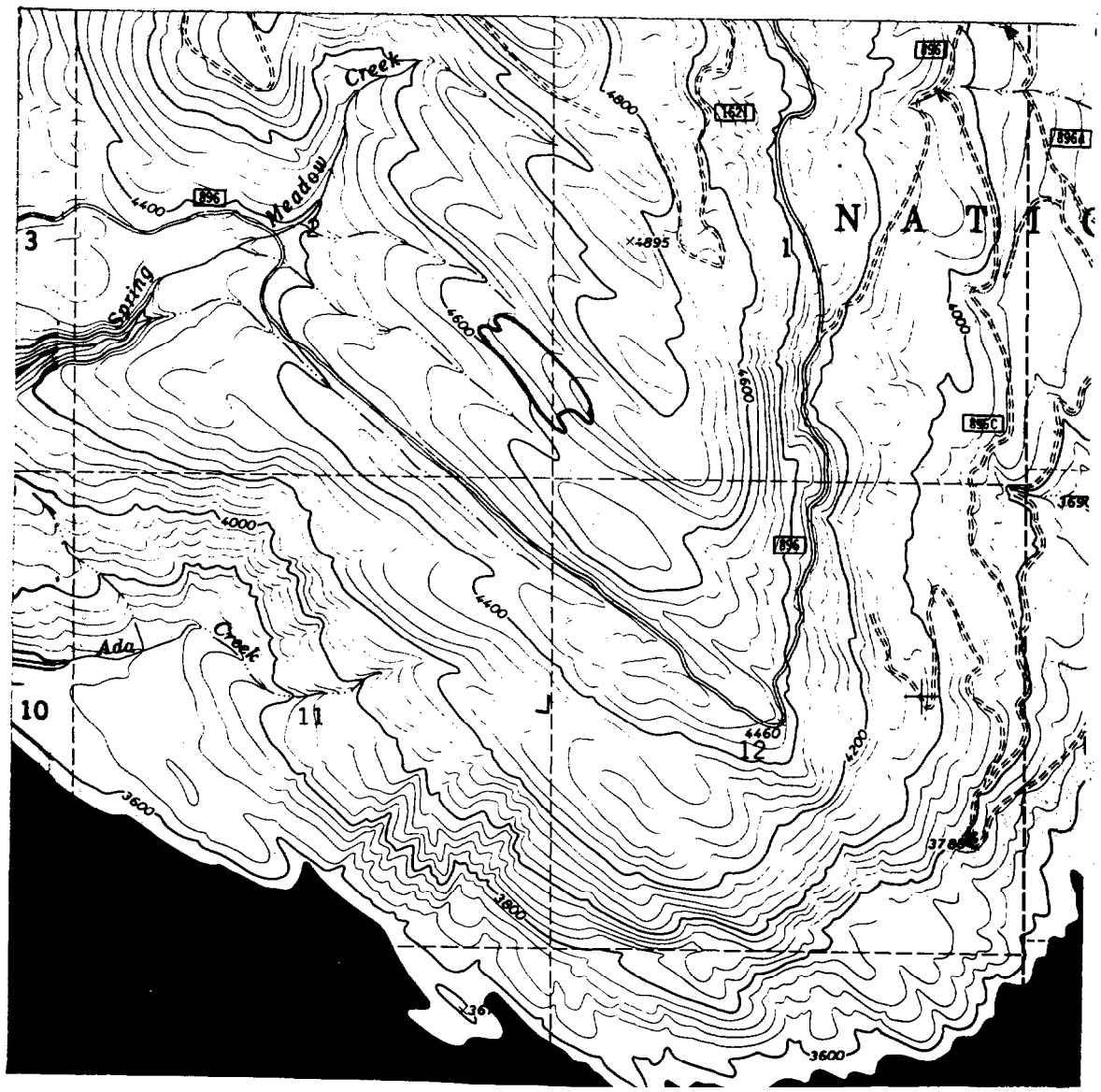
Task 1.48 Harvest (clearcut) 13 acres of stakes and posts in the NW-l/4 Sec.11,T29N,R18W (Site 48). Broadcast burn residual slash during subsequent fall.



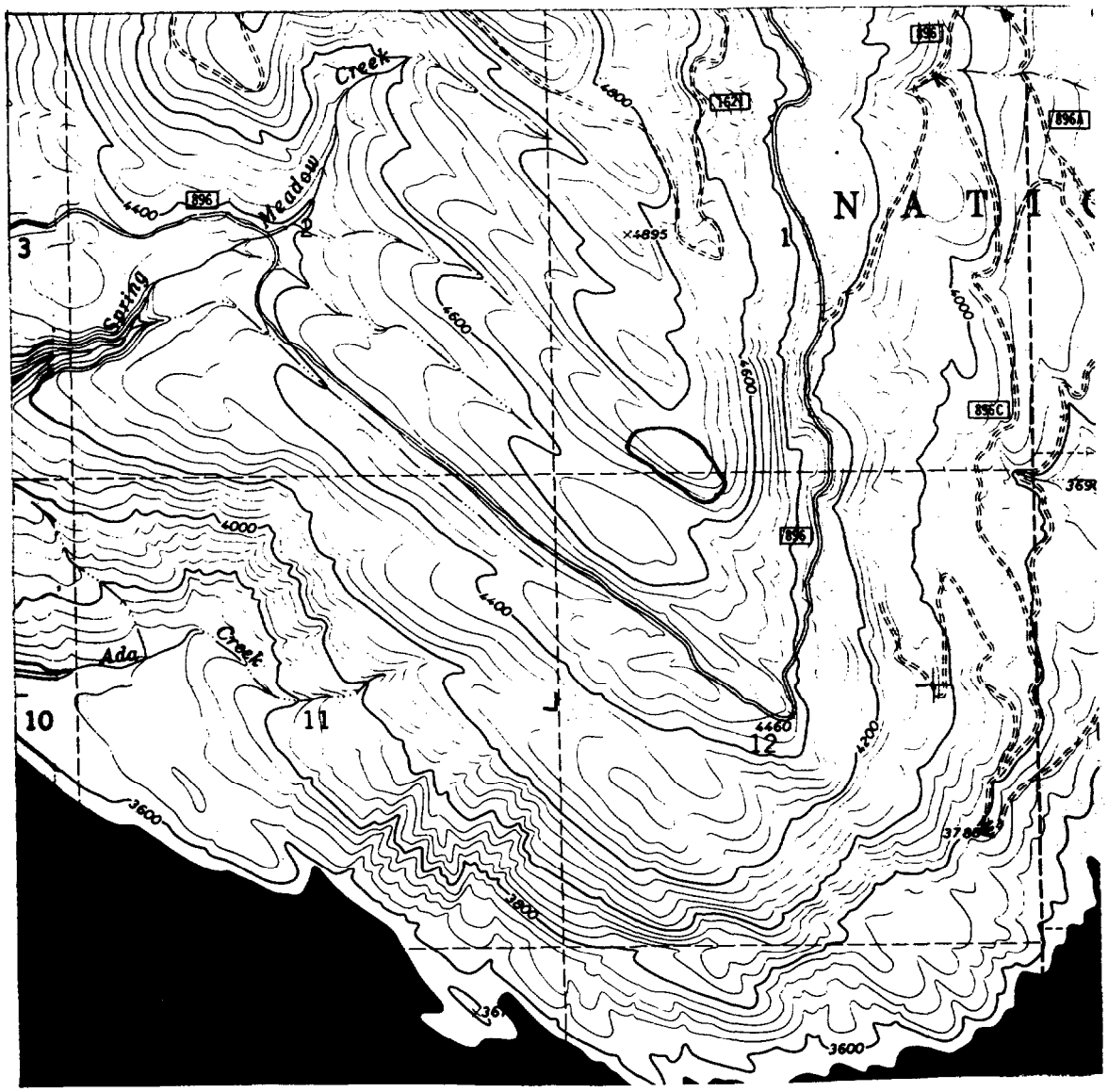
Task 1.49 Harvest (clearcut) 12 acres of stakes and posts in the NW-1/4 Sec.11,T29N,R18W (Site 49). Broadcast burn residual slash during subsequent fall.



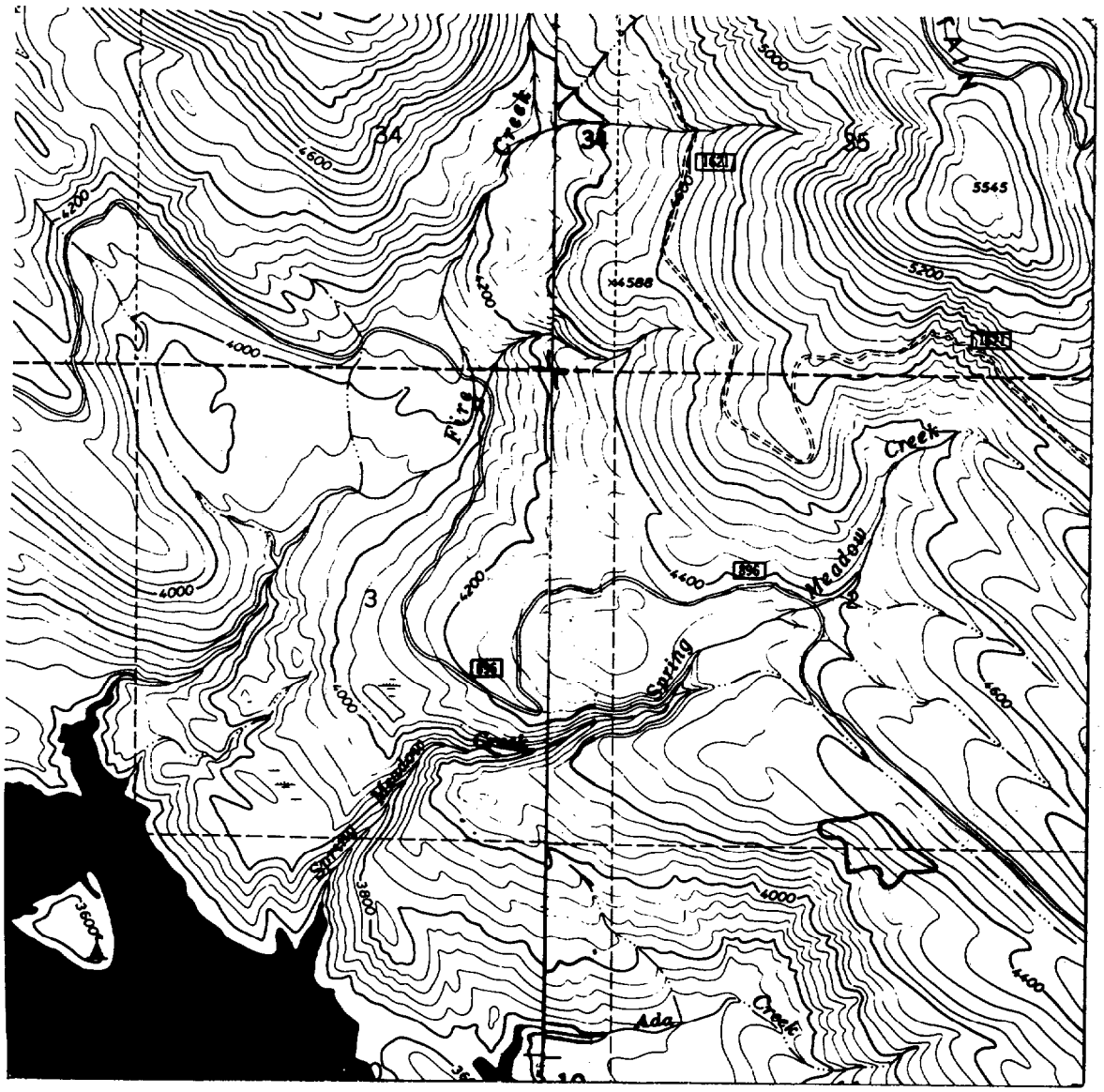
Task 1.50 Harvest (clearcut) 15 acres of stakes and posts in the SE-l/4 Sec. 2,T29N,R18W (Site 50). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



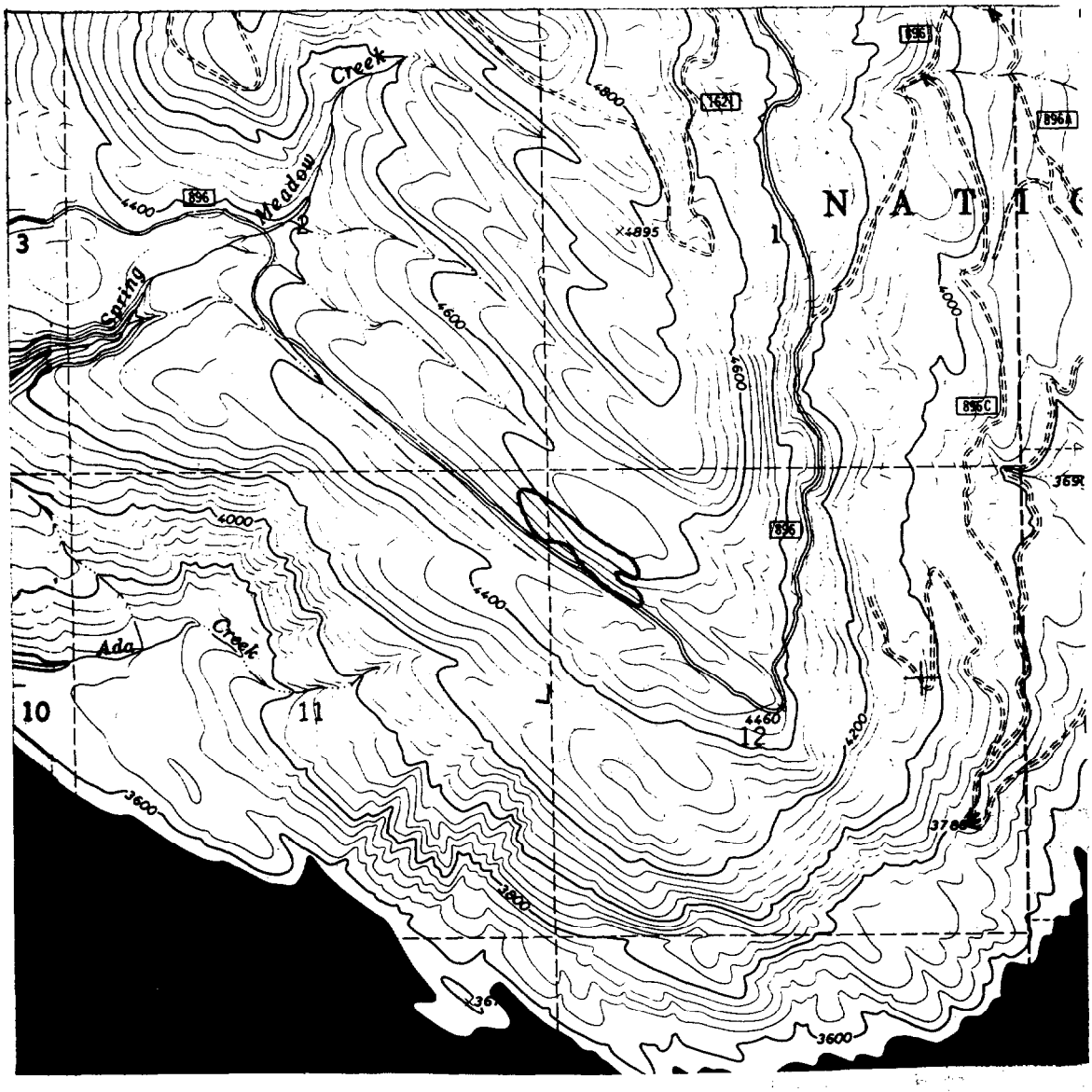
Task 1.51 Harvest (clearcut) 17 *acres* of stakes and posts in the SE-l/4 Sec. 2,T29N,R18W (Site 51). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



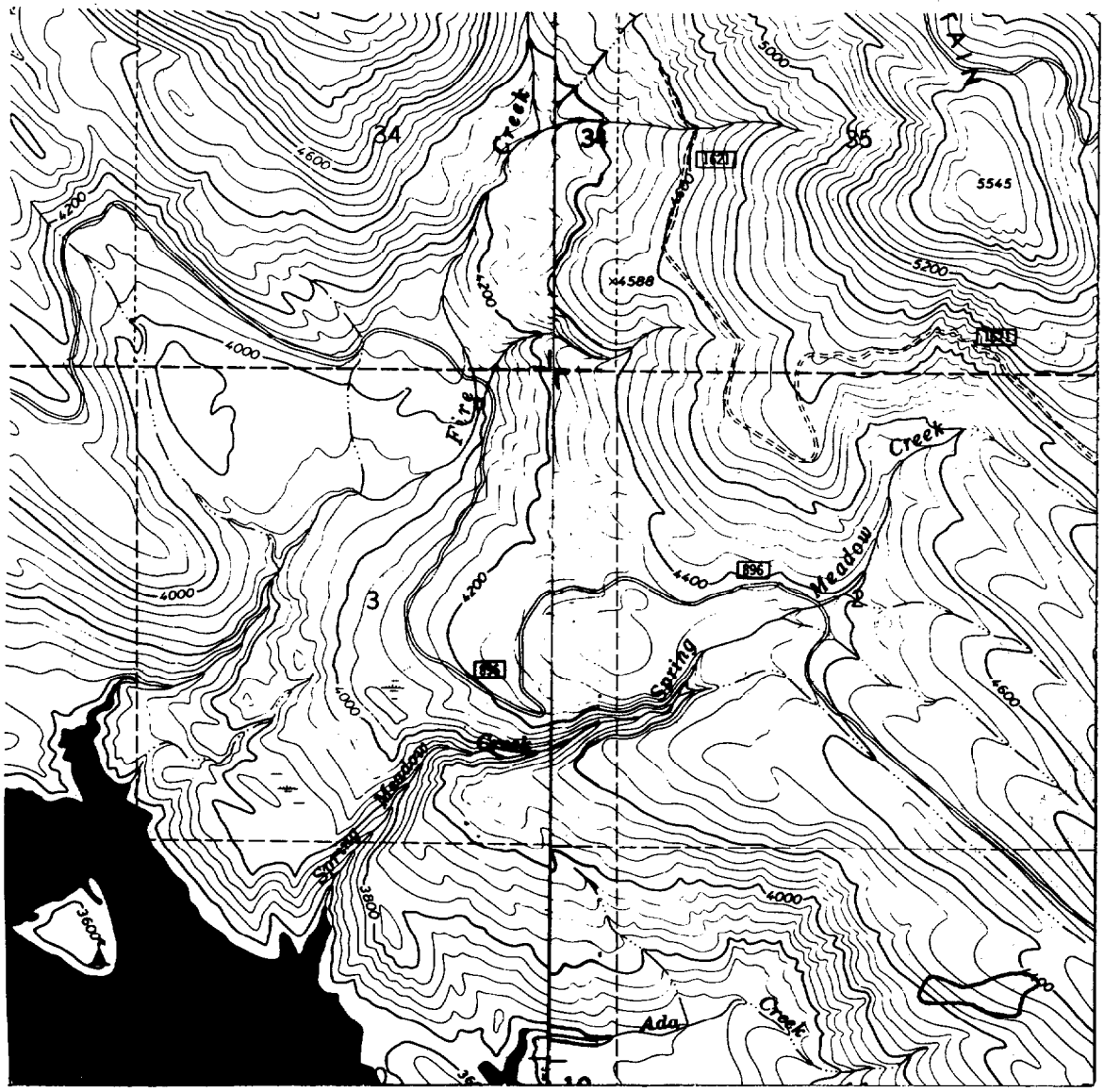
Task 1.52 Harvest (clearcut) 12 acres of stakes and posts in the SW-l/4 Sec. 1,T29N,R18W (Site 52). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



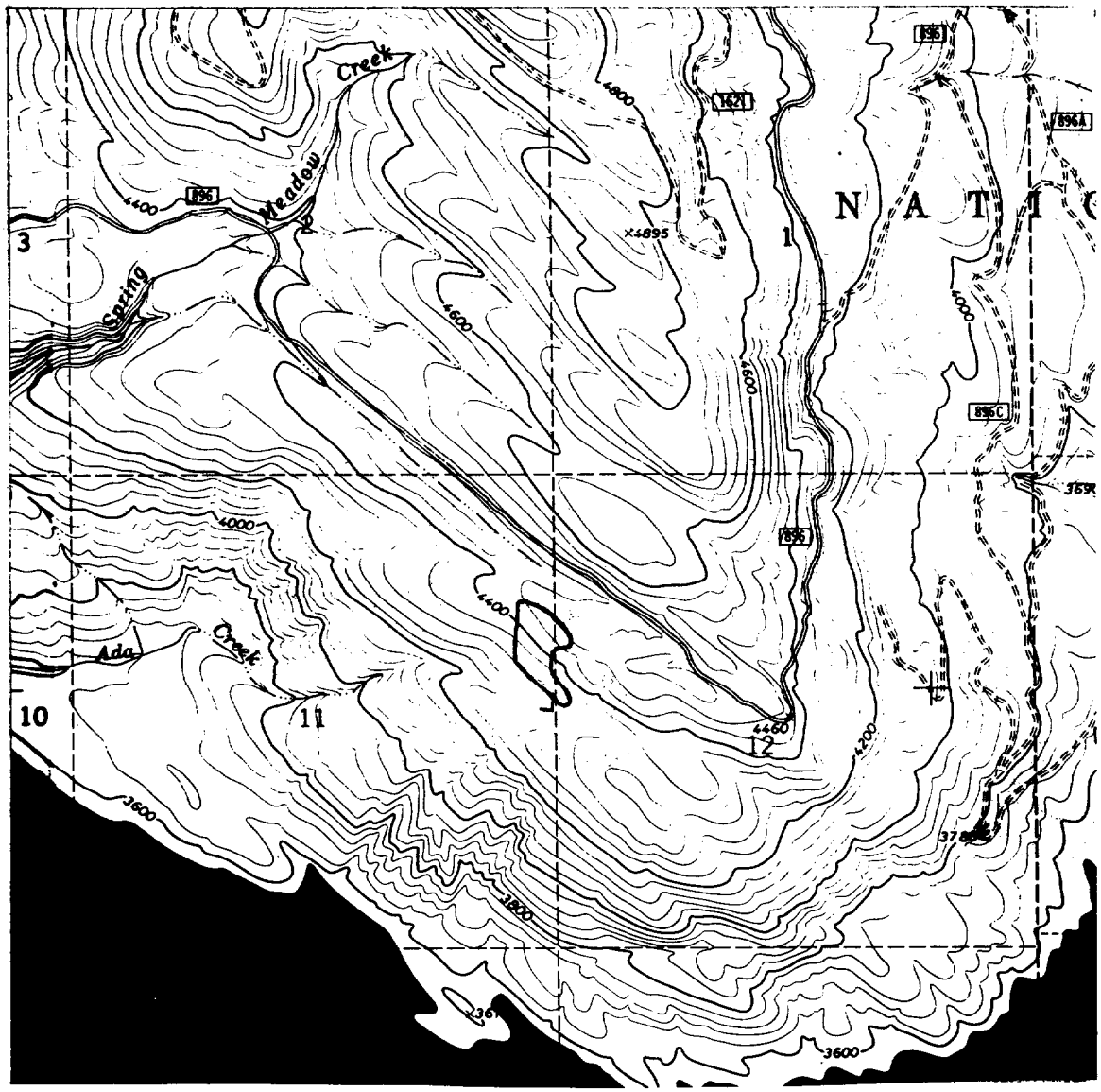
Task 1.53 Harvest (clearcut) 15 acres of stakes and posts in the S-1/2 Sec. 2, and N-1/2 Sec.11,T29N,R18W (Site 53). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



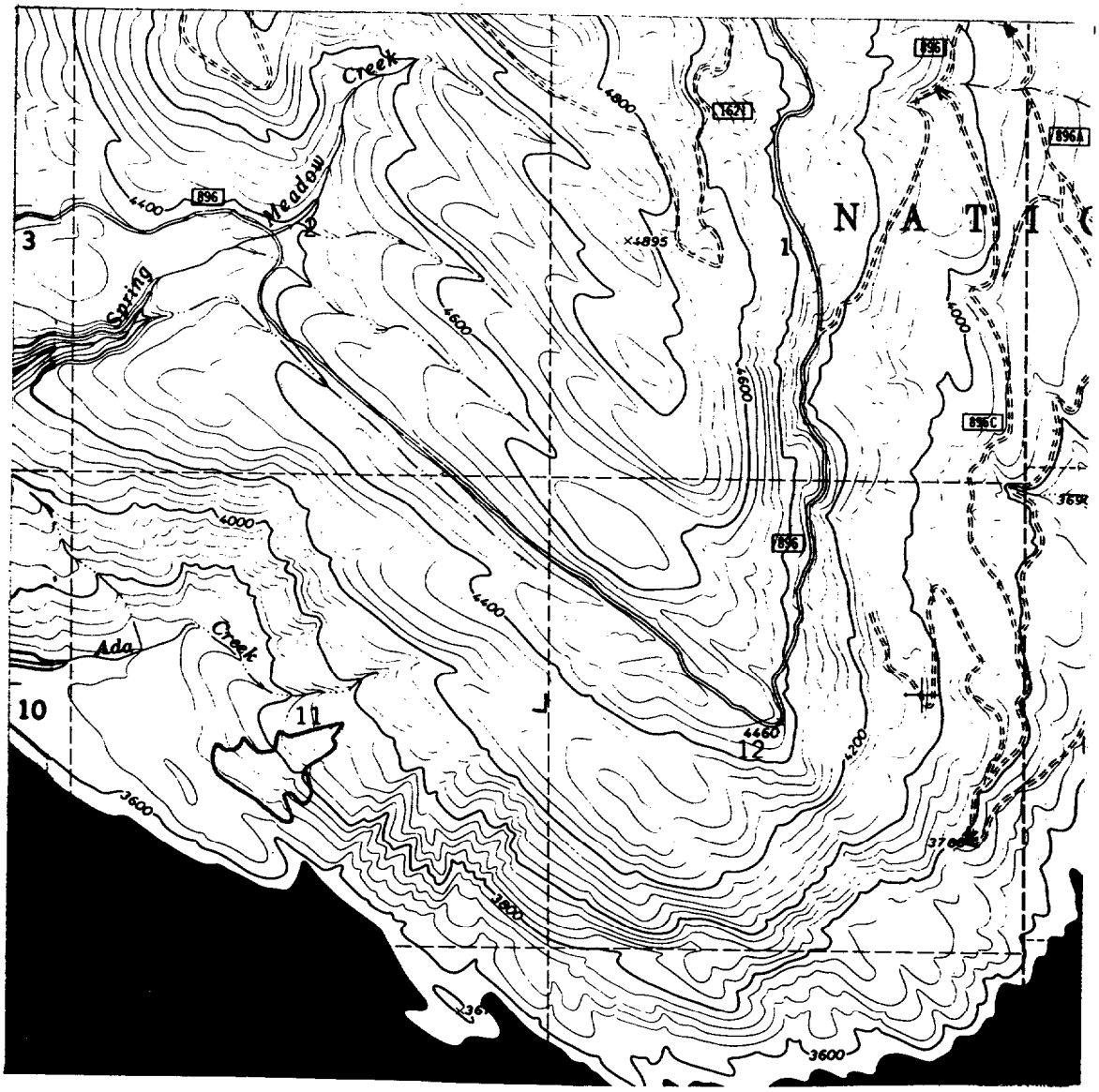
Task 1.54 Harvest (clearcut) 20 acres of stakes and posts in the SE-l/4 Sec. 2, NE-l/4 Sec.11, and NW-l/4 Sec.12,T29N,R18W (Site 54). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



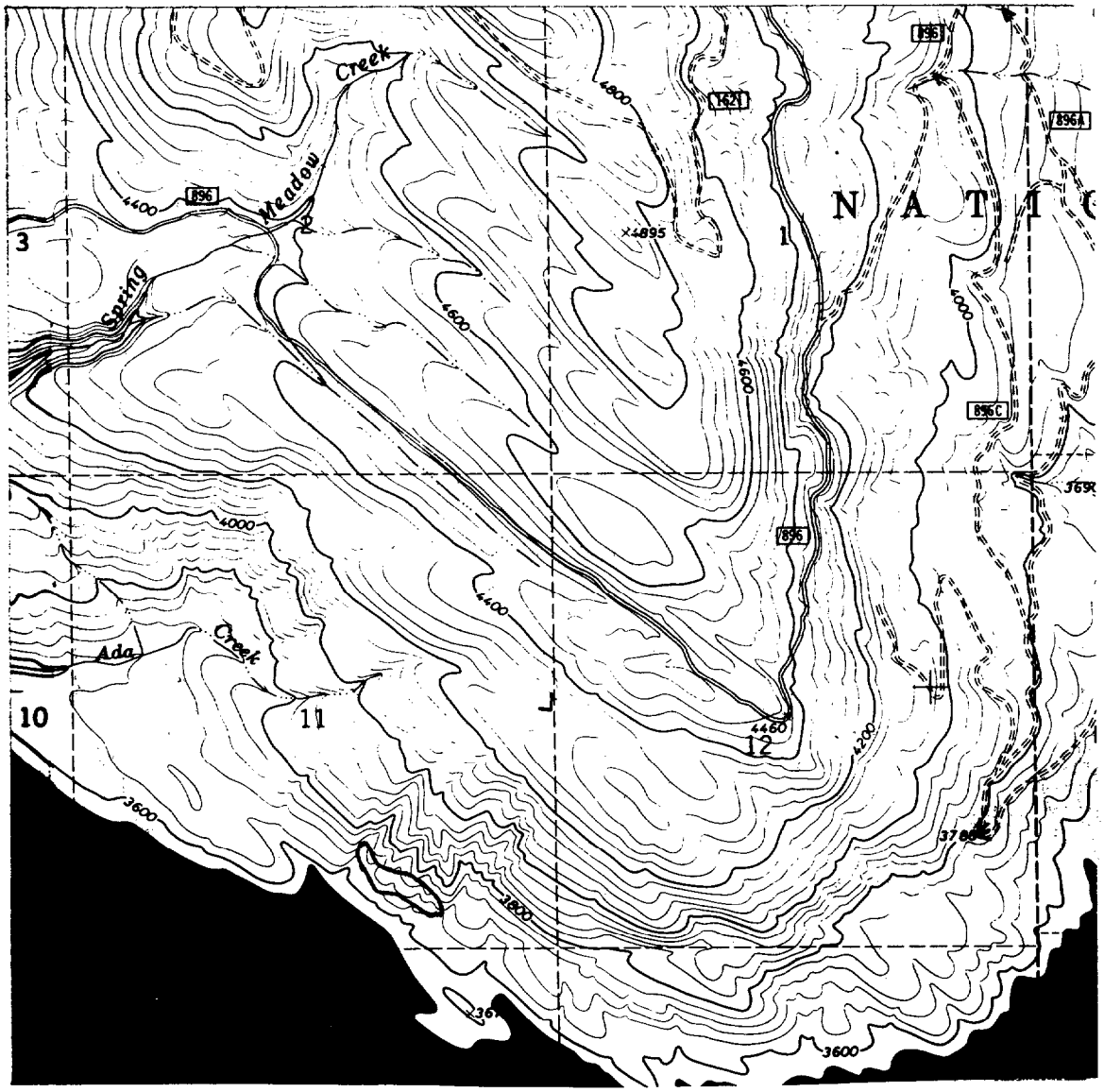
Task 1.55 Harvest (clearcut) 12 acres of stakes and posts in the NE-l/4 Sec.11,T29N,R18W (Site 55). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



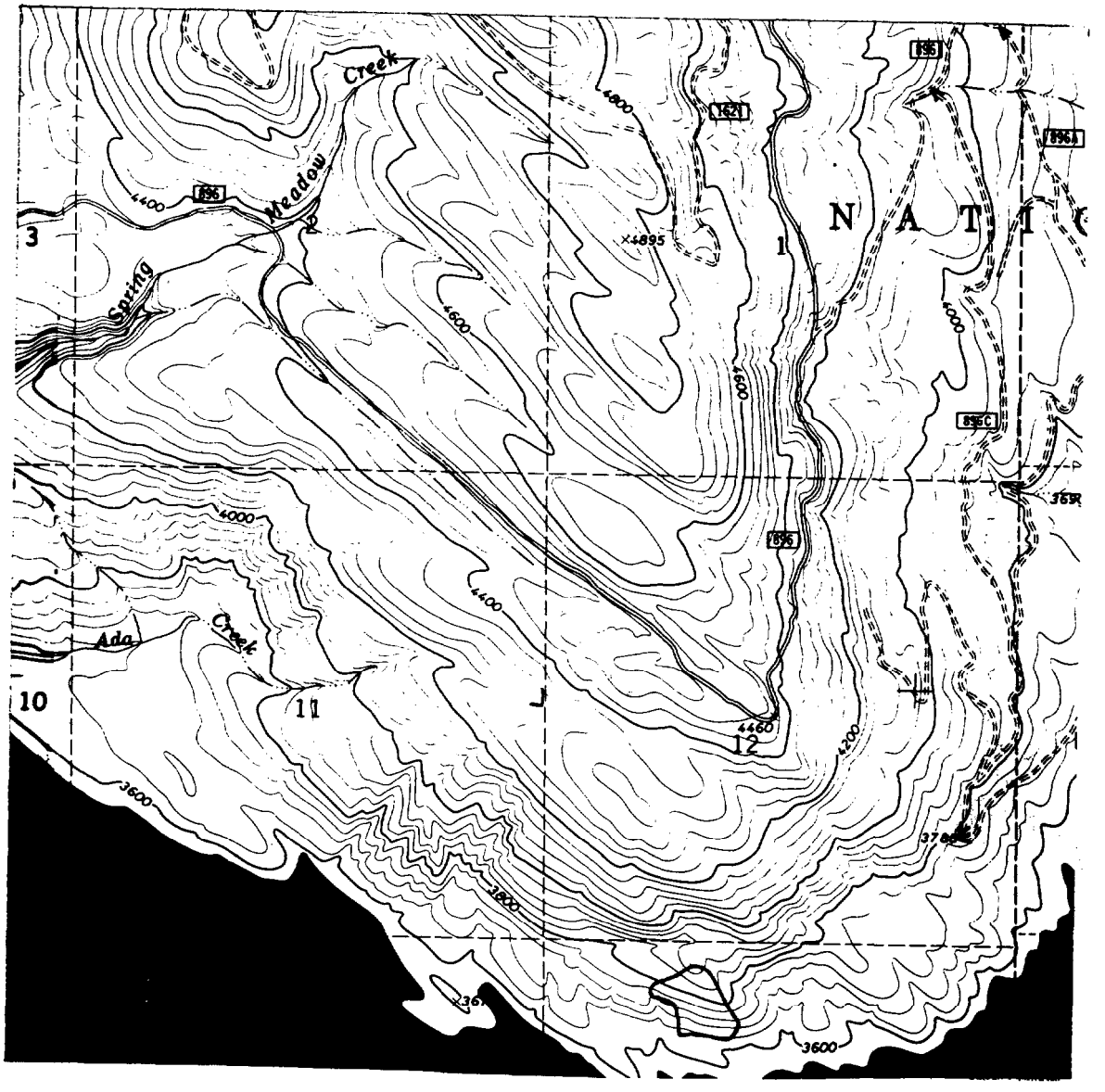
Task 1.56 Harvest (clearcut) 14 acres of stakes and posts in the NE-l/4 Sec.11, and NW-l/4 Sec.12,T29N,R18W (Site 56). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



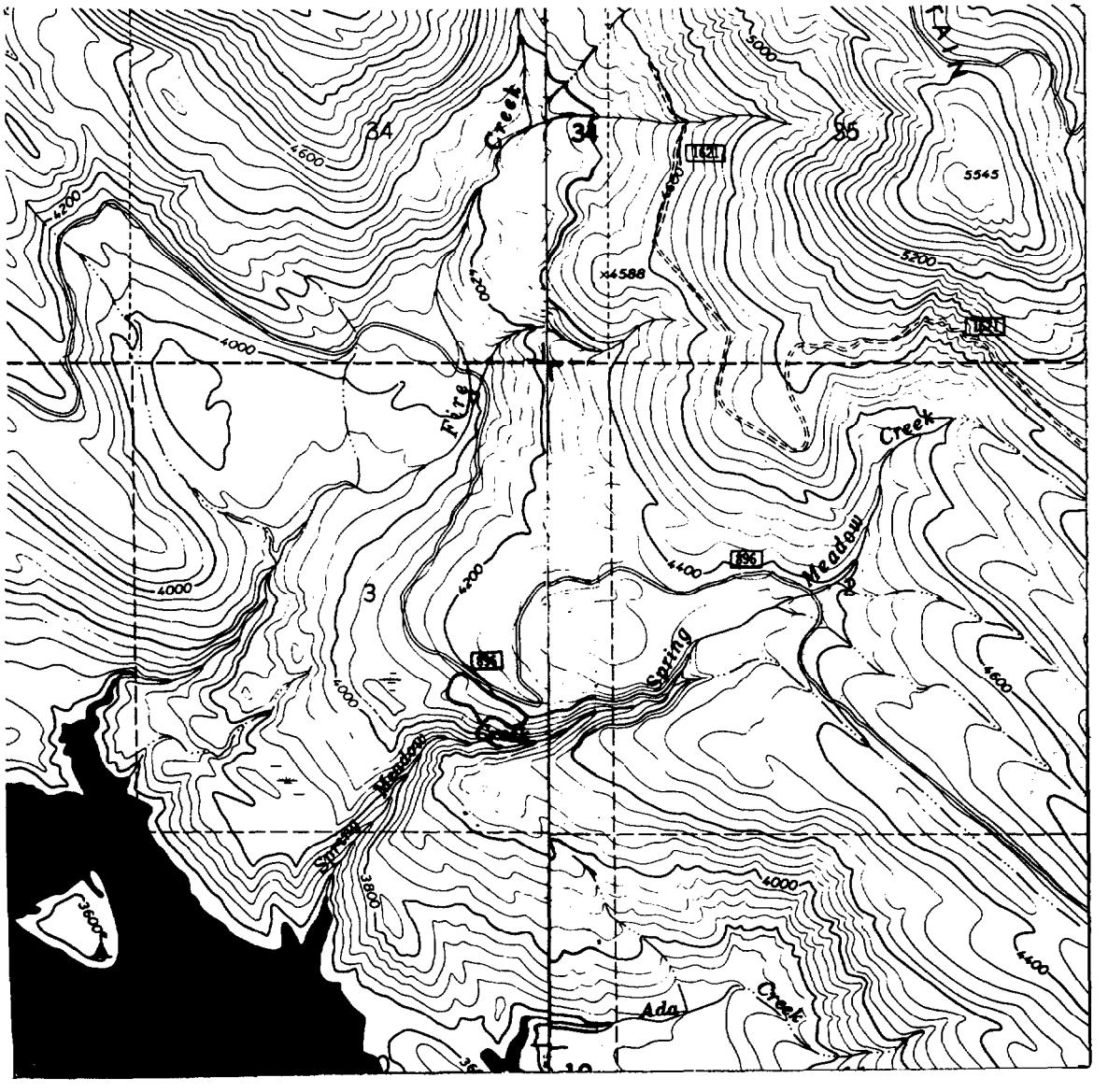
Task 1.57 Slash and broadcast burn (during spring) 16 **acres of lodgepole pine** in the S-1/2 **Sec.11,T29N,R18W** (Site 57). Plant with Douglas-fir.



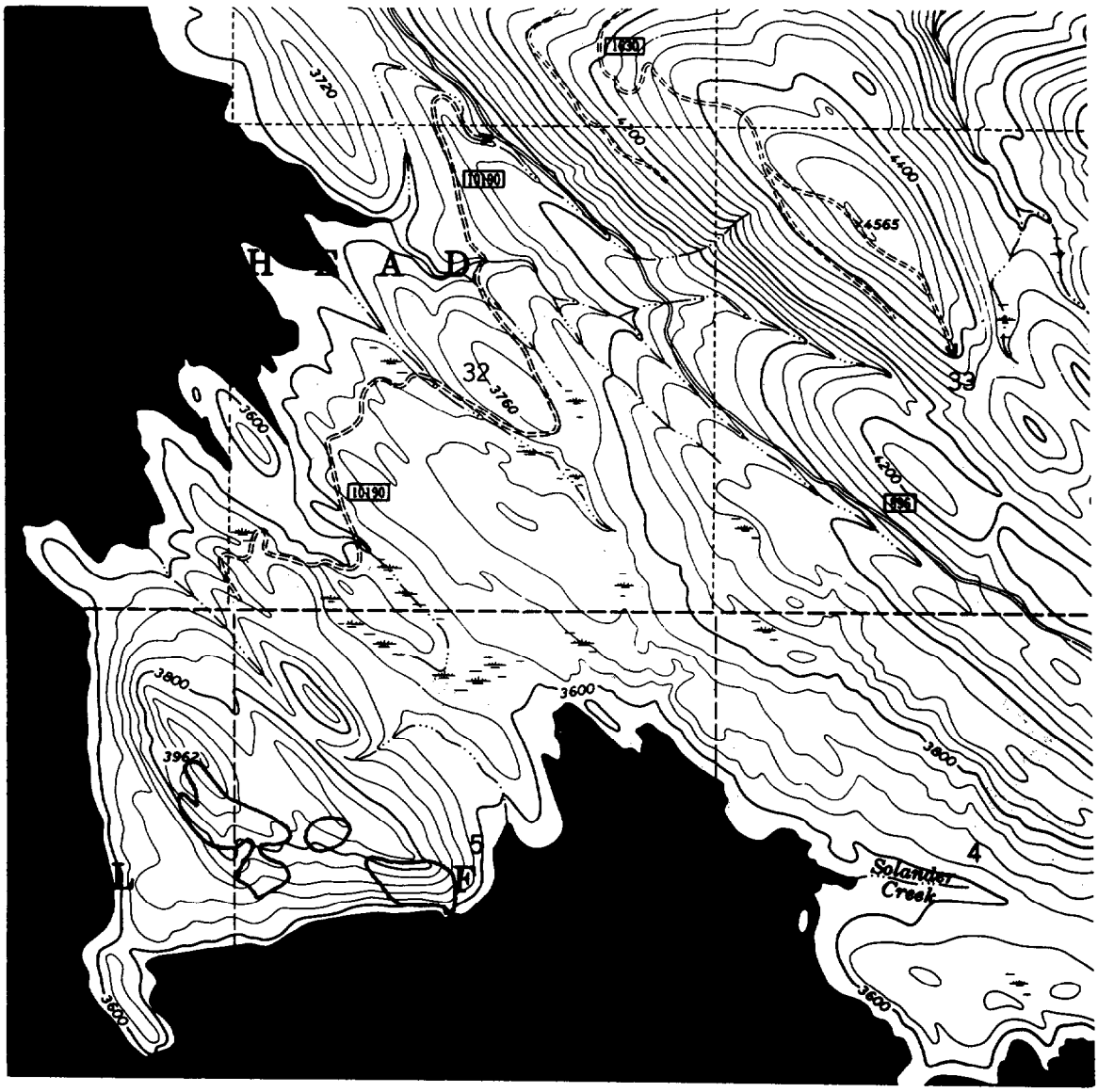
Task 1.58 Harvest (clearcut) 10 acres of stakes and posts in the SE-l/4 Sec.11,T29N,R18W (Site 58). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



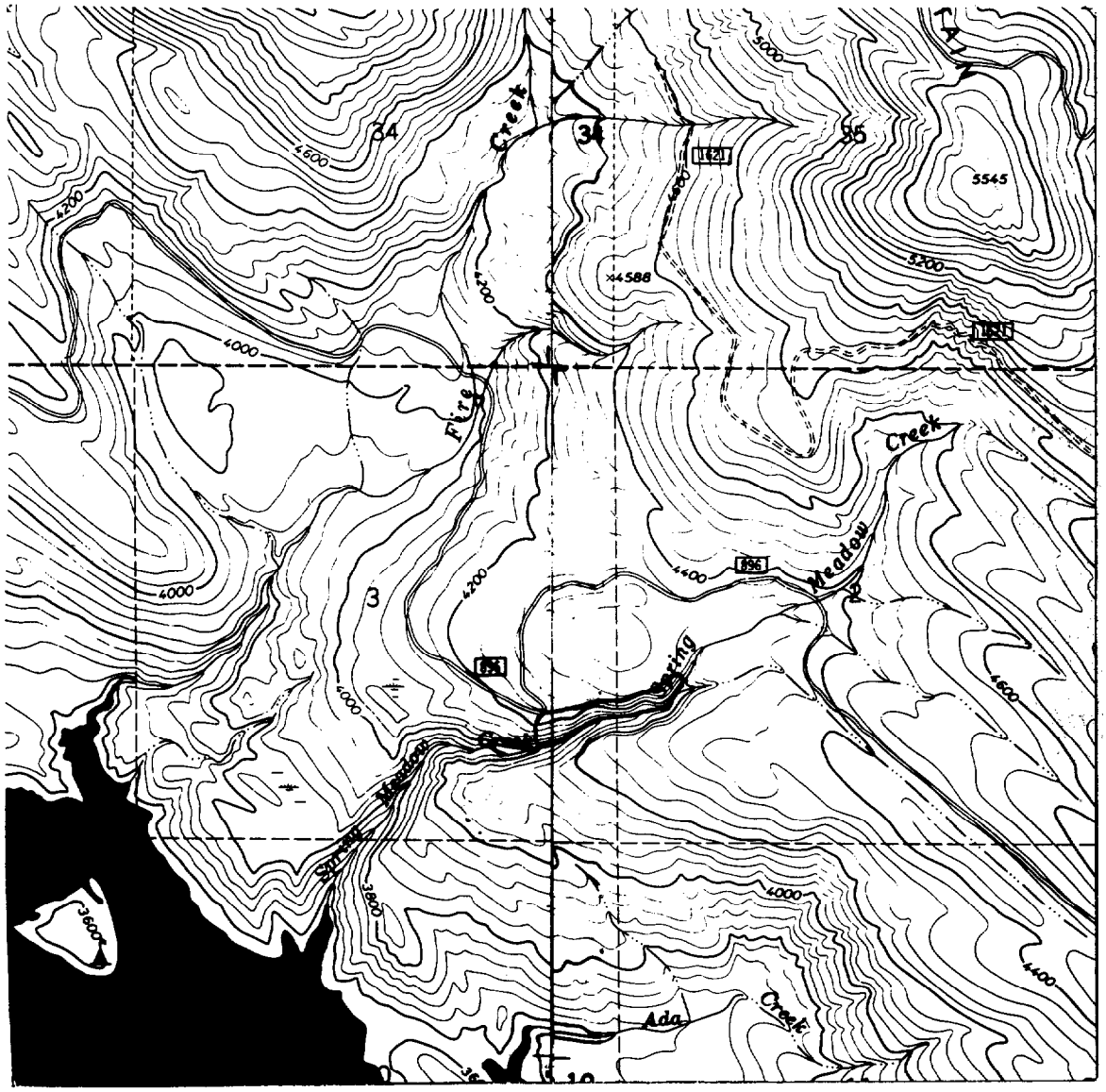
Task 1.59 **Harvest (clearcut) 15 acres of** posts *sawlogs* in the **NW-l/4** Sec.13,T29N,R18W (Site 60). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



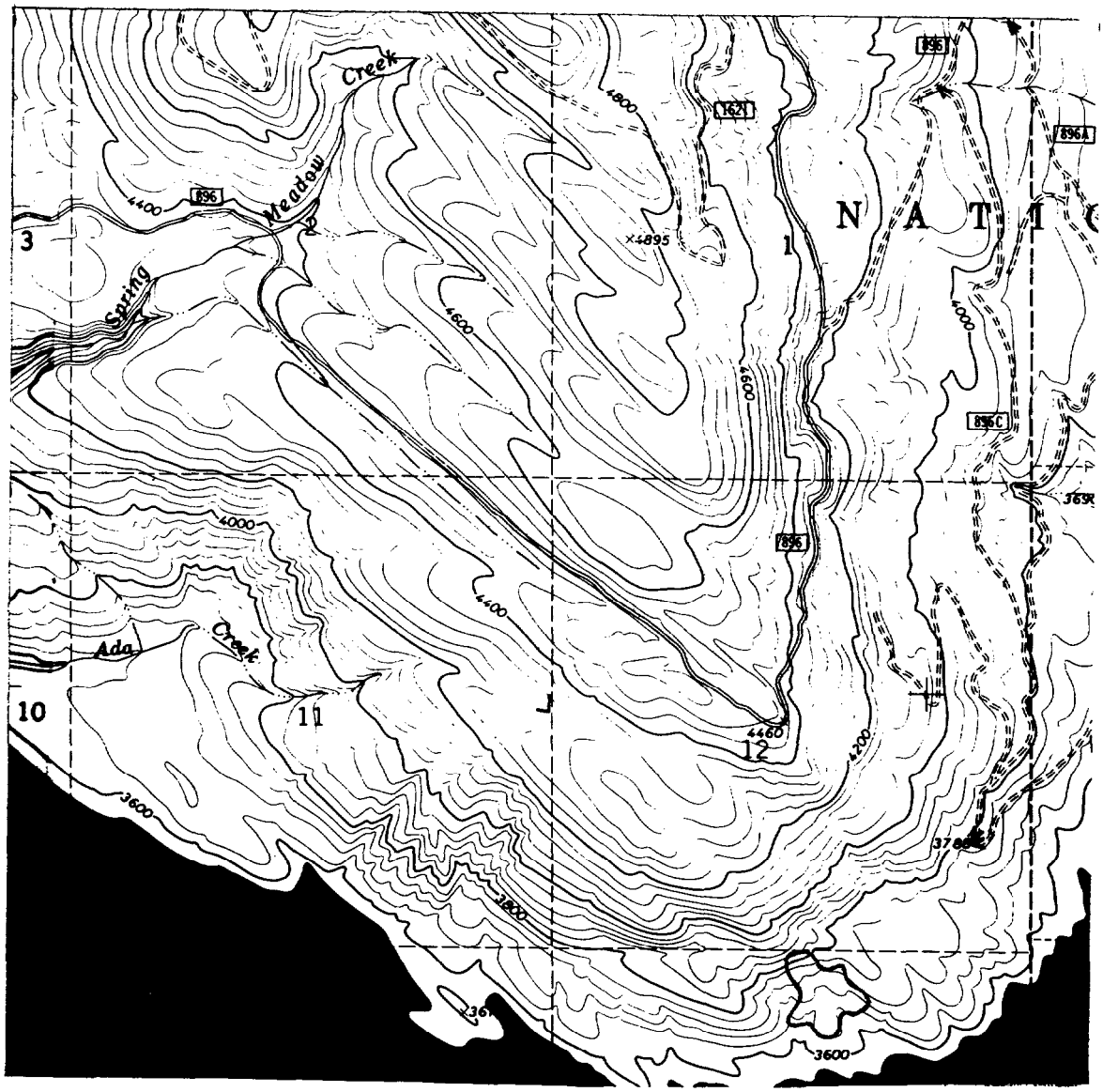
Task 1.60 Harvest (clearcut) 9 acres of sawlogs in the SE-l/4 Sec. 3,T29N,R18W (Site 61). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



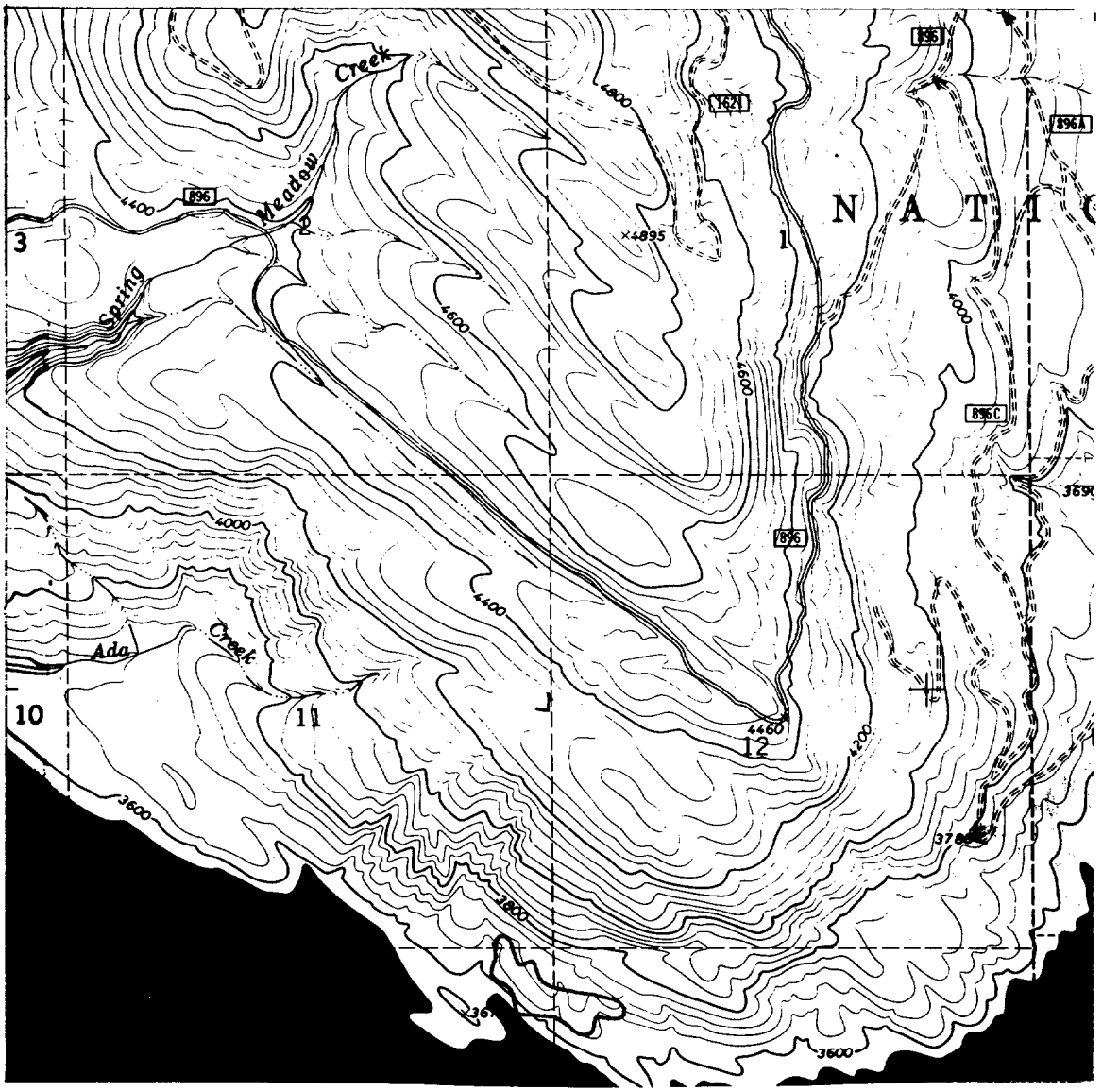
Task 1.61 Broadcast burn 43 acres of shrubfield in the W-1/2 Sec. 5, and E-l/2 Sec. 6,T29N/R18W (Site 62).



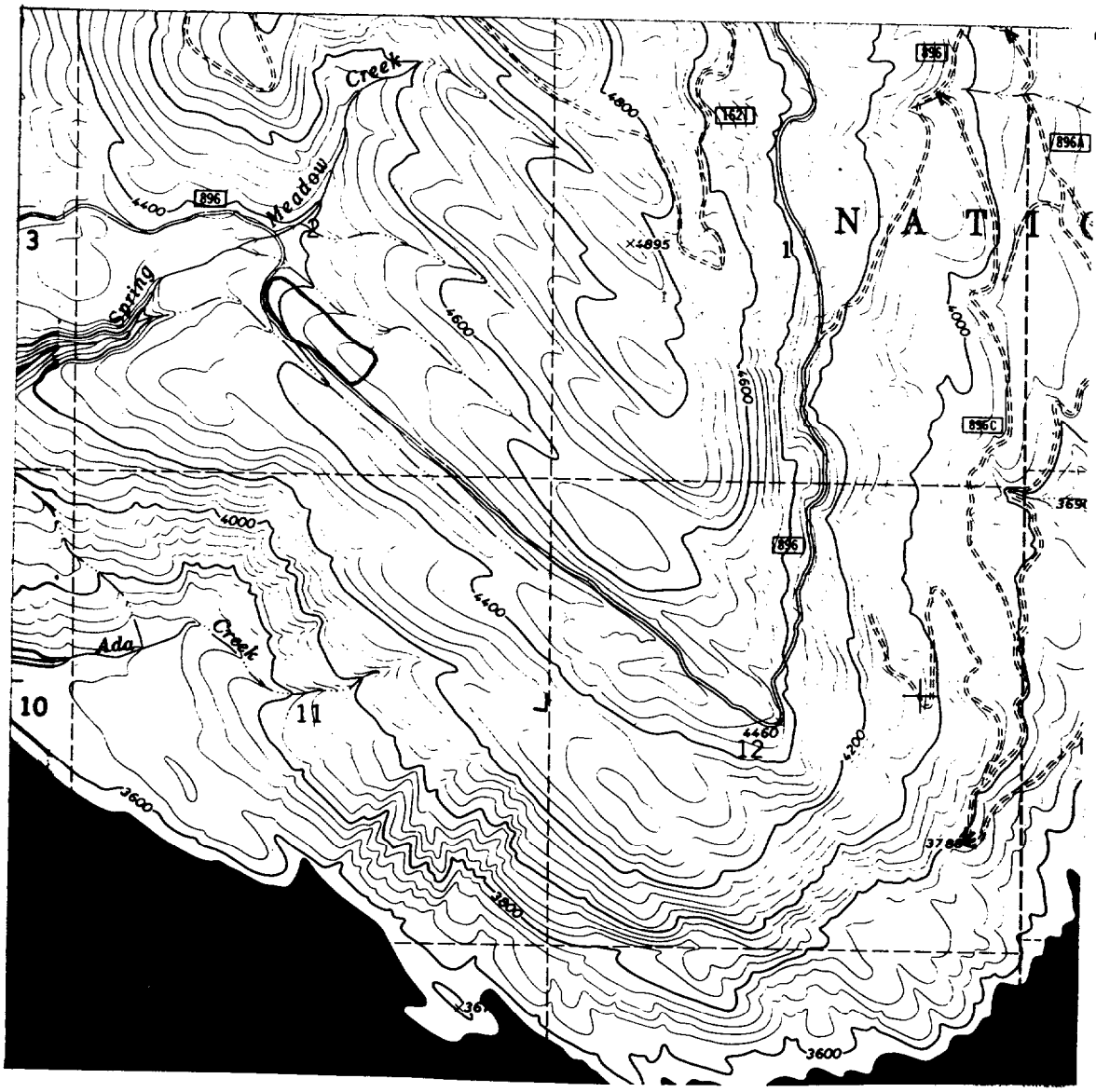
Task 1.62 Broadcast burn 12 acres of shrubfield in the SE-l/4 Sec. 3, and SW-1/4 Sec. 2,T29N/R18W (Site 63).



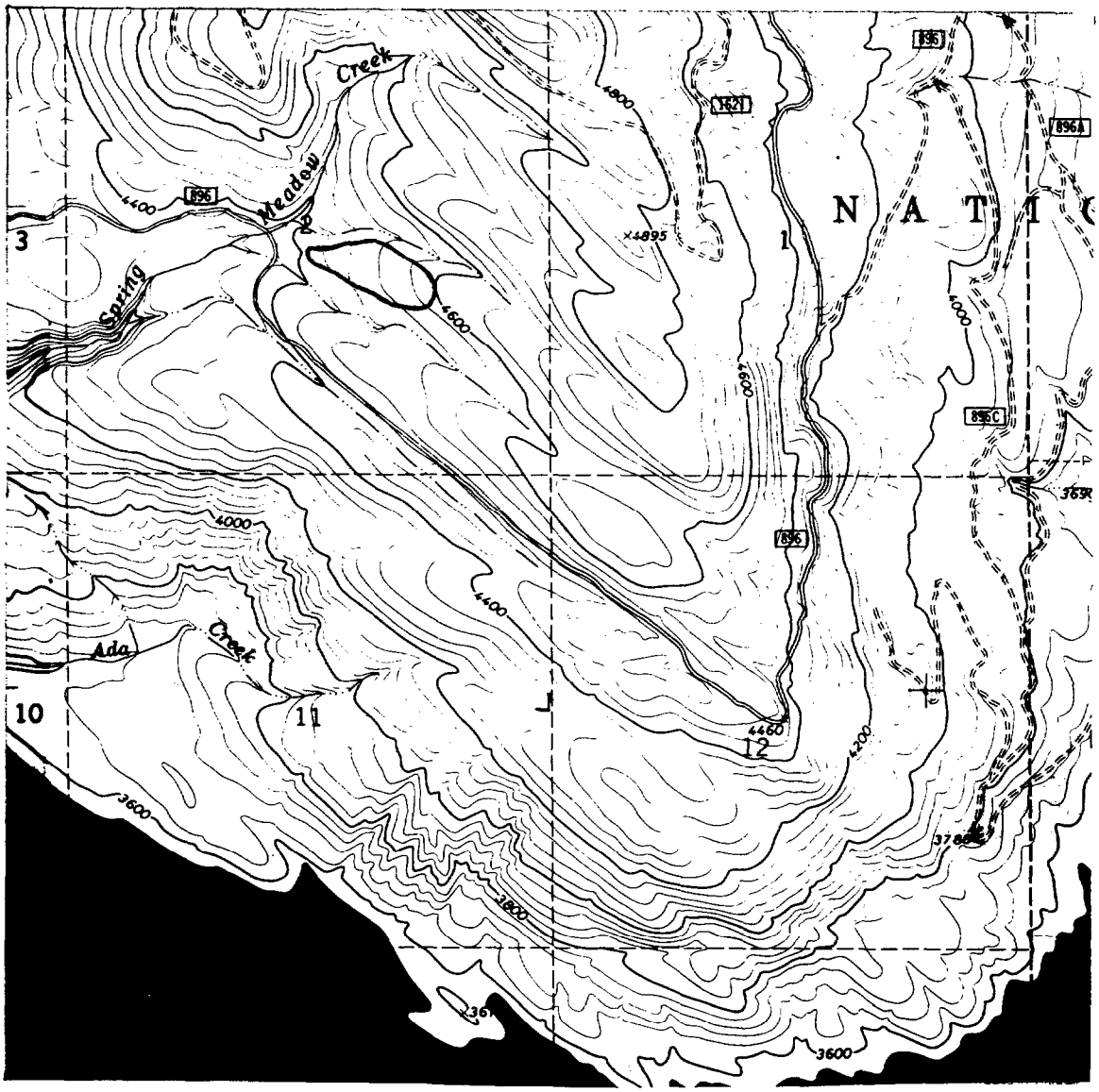
Task 1.63 Harvest (clearcut) 15 acres of sawlogs in the N-1/2 Sec.13,T29N,R18W (Site 64). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



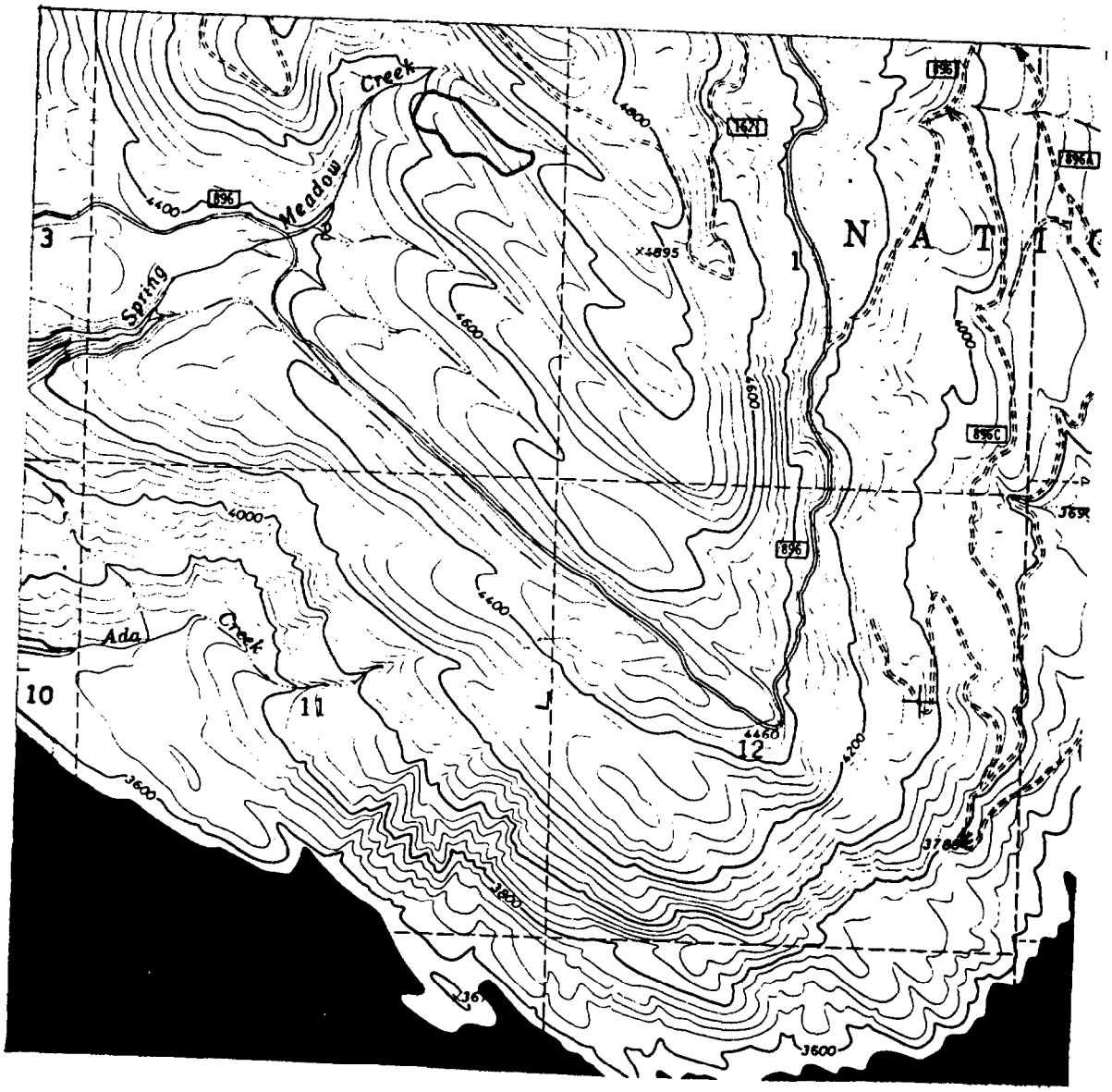
Task 1.64 Harvest (clearcut) 15 acres of sawlogs in the NW-l/4 Sec.13, and NE-1/4 Sec.14, T29N,R18W (Site 66). Broadcastburn residual slash during subsequent spring. Plant with Douglas-fir.



Task 1.65 Harvest (clearcut) 15 acres of **sawlogs** in the S-1/2 Sec. 2, T29N,R18W (Site 69). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



Task 1.66 Harvest (clearcut) 10 acres of sawlogs in the SE-l/4 Sec. 2, T29N,R18W (Site 70). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.



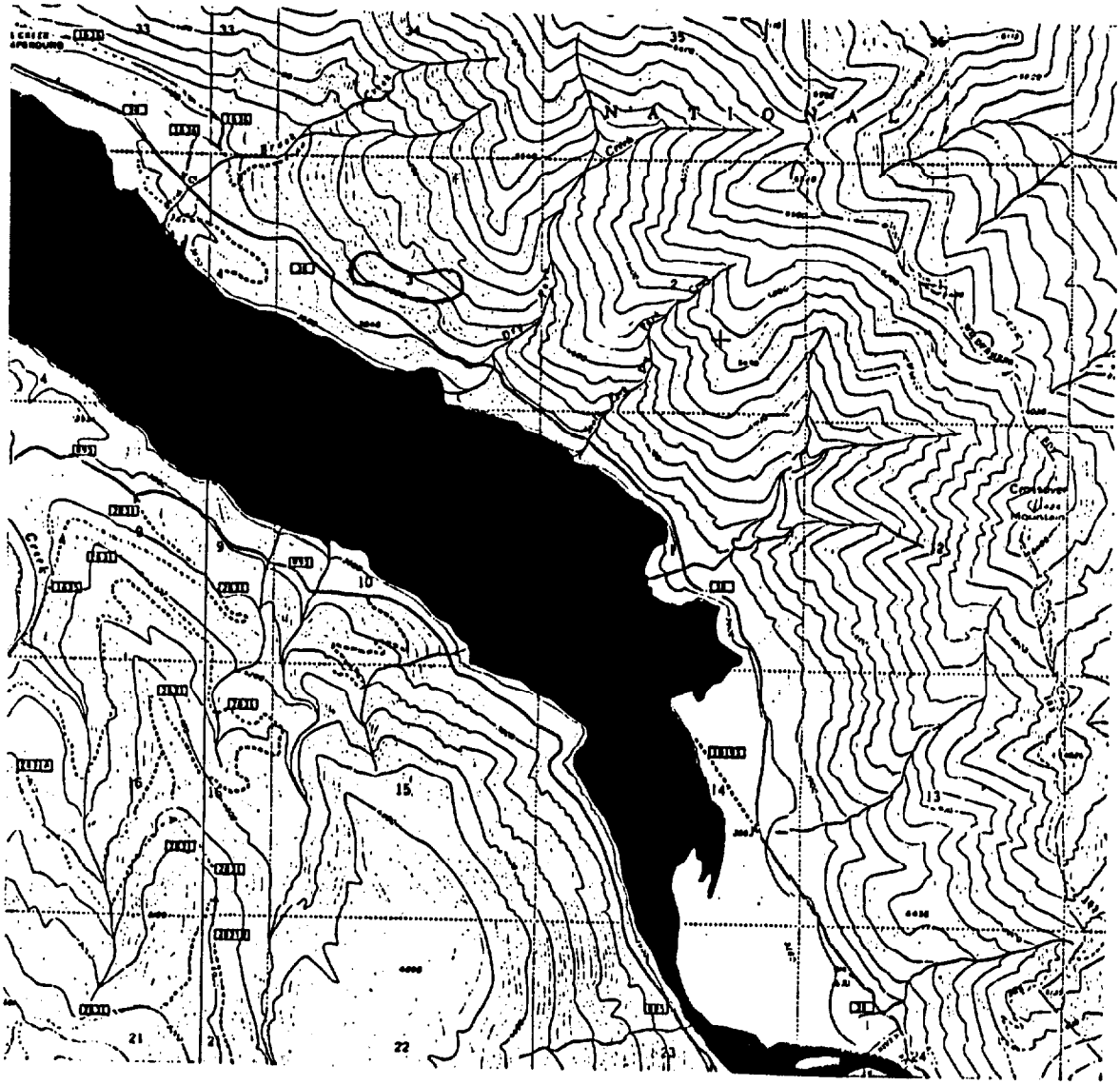
Task 1.67 Harvest (clearcut) 10 acres of sawlogs in the NE-l/4 Sec. 3, T29N,R18W (Site 71). Broadcast burn residual slash during subsequent spring. Plant with Douglas-fir.

OBJECTIVE 2: Rehabilitate big game winter range in the Dry Parks / Spotted Bear area adjacent to Hungry Horse Reservoir.

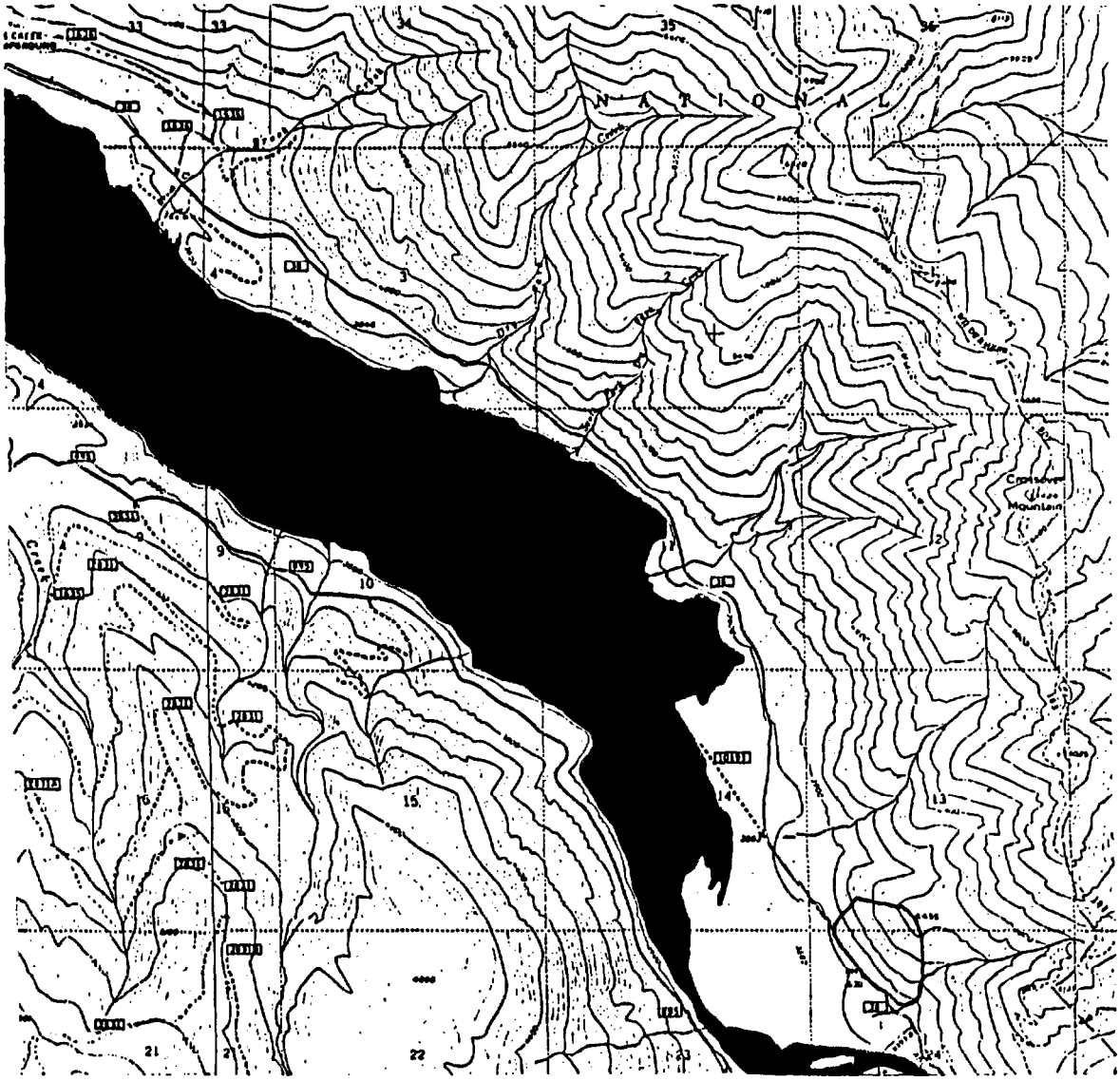
TREATMENT SITES AND SCHEDULE

Site.	Location*	Acres	Treatment	Dates
2'	Sec. 3/T26N/R16W	27	Prescr. Burn	91-93
3	Sec.24/T26N/R16W	61	Prescr. Burn	91-93
5	Sec.11/T26N/R16W	69	Prescr. Burn	91-93

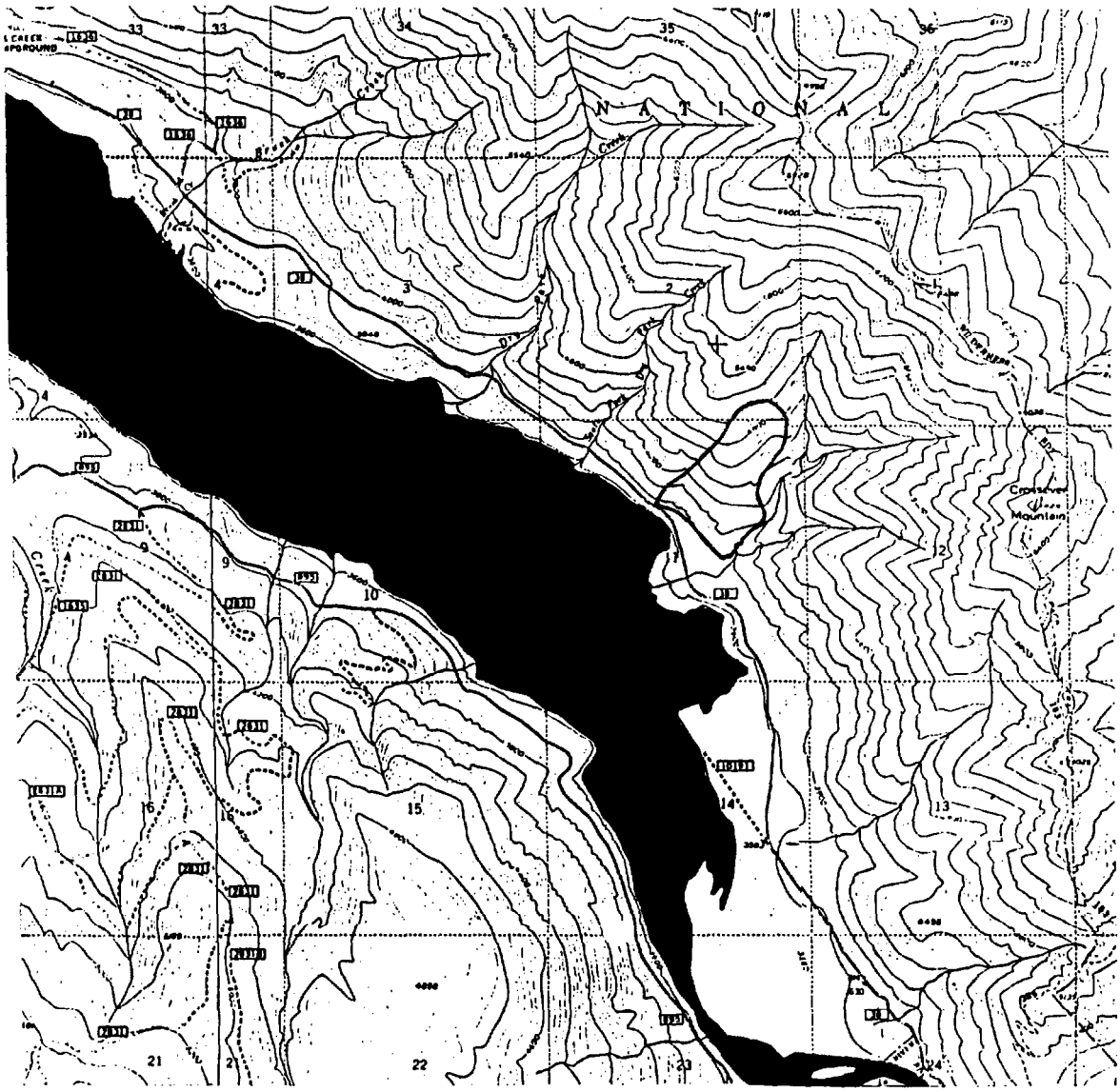
* Section which contains the majority of each unit is listed.



Task 2.1 Broadcast burn 27 acres of shrubfield in the S-1/2 Sec. 3,T26N/R16W (Site 2).



Task 2.2 Broadcast burn 61 acres of shrubfield in the SW-l/4 Sec.13, and NW-1/4 Sec.24, T26N/R16W (Site 3).



Task 2.3 Broadcast burn 69 acres of shrubfield in the SE-l/4 Sec. 2, and NE-1/4 Sec.11, T26N/Rl6W (Site 5).

MONITORING AND EVALUATION

Evaluation and monitoring of the treatment sites identified in this plan is an essential part of the mitigation program for Hungry Horse Reservoir. The evaluation and monitoring plan for this project will be completed in draft form by 31 October 1990, following more complete analysis of baseline data collected to date (Casey and Malta, in prep.), but is presented in conceptual form here.

The monitoring effort will serve as our tool for evaluating whether the mitigation goal has been achieved. The population monitoring portion of the plan will be structured to determine current population size and distribution, herd structure and population dynamics, and the changes in these population attributes as enhancement activities are implemented. The habitat monitoring effort will be structured to document changes in the density, species composition, canopy coverage, and vigor of vegetation in treatment areas and control sites.

Population Monitoring

Baseline population levels of both elk and mule deer have been established for both the Firefighter Mountain and Dry Parks / Spotted Bear winter ranges during the period Jan. 1988 through May 1990 (Casey and Malta, in prep.). Long-term population monitoring efforts will identify population trends relative to these baseline data. Our mitigation approach is based in part on the assumption that carrying capacities on existing big game winter ranges could be increased by 33% through enhancement (Bissell and Yde 1985).

It appears (Casey and Malta in prep.) that a sample size of at least 20-40 marked animals will need to be maintained in each winter range to provide reliable population estimates using aerial surveys (Rice and Harder 1977). Revision of the original observability estimate for this area (Biggins 1975), using methods adapted from (Samuel et al. 1987), will provide a "sightability" model for the area (Casey and Malta, in prep.), which will be used to refine population estimates from aerial surveys. Fixed-wing aerial surveys will be conducted at least twice monthly on a year-round basis. Helicopter surveys will be conducted at least once a year to provide more reliable classification (sex/age) data. These surveys will be coordinated with other regional inventory flights to maximize data-sharing and efficiency of data collection, as during the baseline phase of this project.

Seasonal home ranges of marked animals will be identified over time, to identify potential shifts in distribution as enhancement activities are undertaken. Identification of such shifts in distribution will be essential to assessing the value of treatments, and for determining whether increased use indicates actual population increases. Pellet group and browse utilization surveys will also serve as indicators of both population size and distribution. Sample size for these transects will be based on analysis of baseline data, but at a miinimum, pellet group surveys will be conducted in representative treatment sites in the year(s) immediately before and after initial treatment. Similarly, sample size and analysis techniques for pellet groups collected during winter and spring will be determined from ongoing analysis of baseline data, but at a minimum one

composite sample will be collected to identify food habits from each winter range for each of the first three years of implementation.

Vegetation Monitoring

Since increases in the quality, quantity and distribution of available forage are the primary means with which we hope to increase carrying capacity, vegetationmonitoringwillbe used to assess progress toward the mitigation goal. At a minimum, it will be important to document changes in the abundance, canopy coverage, and frequency of forage and other plant species at treatment sites and control sites. ECODATA methods are currently used by the Forest Service to collect vegetation community and trend data. They comprise a set of standardized plot-based techniques for collecting' vegetation data at various levels of complexity, from mere species composition to nested rooted frequency. Appropriate ECODATA methods will be selected jointly by MDFWP and Forest Service personnel for use during vegetation monitoring. These data will be entered and analyzed using Forest Service computer models. Use of these techniques will provide consistency with other data collected on the District and the Forest, and should increase the applicability of our data.

Vegetation response to treatment will be measured during at least the first three seasons following treatment, on a selected representative set of treatment sites. Vegetation response will be compared on fertilized, seeded plots and similar control areas. Game-proof **exclosures** will provide for comparisons of forage response and vigor with and without browsing/grazing pressure. Different treatment types will be compared for differences in vegetation, as well as differneces from baseline conditions (pre-treatment) and control (untreated) sites.

Browse utilization transects will continue to be used to assess big game use of current annual growth of important shrub forage species (e.g. maple, serviceberry). Sample size and locations will be determined so as to complement, rather than duplicate, data collected using ECODATA methods.

Other Monitoring

Forest Service personnel will be responsible for monitoring other resources as required for all major management activities. These include moni'toring timber sale activity to ensure compliance with Best Management Practices as outlined in the Forest Plan, and inspection of success of regeneration efforts. Treatment sites will be monitored for compliance with visual resource management objectives, snag management, cultural resources, water and soils managaement, and compliance with area closures.

An important component **of the** monitoring effort will be to develop an acreage credit to be applied against mitigation goals. At a minimum, the 547 acres of enhancements funded by the Trust will be credited, provided that enhancement efforts are successful. The extent to which Trust funds are used on timber harvest units (i.e. if timber sale proceeds are inadequate to complete proposed enhancement activities such as burning or seeding) will also play a role in acreage accounting. Monitoring results may also indicate whether physical

enhancement activities on certain acreage effectively enhance adjoining acreage, in which case those additional acres would also be credited against mitigation goals.

PERSONNEL REQUIREMENTS

The diversity and extent of the enhancement activities outlined in this long-term plan will require an extensive and intensive monitoring and evaluation effort. Interagency efforts will be needed both to facilitate implementation of the enhancement activities and to undertake the monitoring effort. Specific monitoring activities will be conductedby personnel from both the Forest Service and MDFWP.

Vegetation response to treatments will be evaluated by personnel from each of the two agencies. Forest Service activities will be primarily aimed at determining reforestation needs and success (seedling survival), fuel loads and moisture, and vegetative community structure (ECODATA plots). MDFWP personnel will aso participate in ECODATA analysis, and will conduct additional survey of browse condition and utilization. These monitoring tasks will require at least one person from the Forest Service and at least two people from MDFWP during at least the 4-month vegetation field season (May - August).

Compilation, computer entry, edits and preliminary analysis of vegetation monitoring data will take at least two months per year, and will be conducted by both agencies cooperatively. Draft annual reports of vegetative conditions and response will be prepared by MDFWP and reviewed by Forest Service personnel. The final report will be cooperatively submitted to the Trust Fund Advisory Committee.

The monitoring of elk and mule deer populations within and adjacent to the project area will be accomplished almost exclusively by MDFWP personnel. Trapping, marking, and surveys of marked and unmarked animals will be conducted systematically throughout the year. Data entry, editing and analysis will also be conducted throughout the year, with annual results summarized in draft annual reports. The final report will include a summary of distribution'and population trends for the entire long-term project period. These tasks will require continued staffing of at least 2 full time personnel at MDFWP for the project period.

LITERATURE CITED

Biggins, D.E. 1975. Seasonal habitat relationships and movements of the Spotted Bear elk herd. Montana Dept. Fish and Game Job Final Rept. Proj. No. W-120-R-6 and 7. Study No. BG-3.2, Job No. 1. 90p.

Bissell, G.N, and G.A. Yde. 1985. Wildlife and wildlife habitat mitigation plan for Hungry Horse hydroelectric project. Prep. by Montana Dept. Fish, Wildlife and Parks for Bonneville Power Admin., Portland, OR. 46p.

Casey, D., P. Malta. (in prep.) Northwest Montana wildlife habitat enhancement: Elk/Mule Deer winter range, Hungry Horse Reservoir. Interim Report, 1987-1990.

Casey, D., C.A. Yde, A. Olsen. 1984. Wildlife impact assessment and summary of previous mitigationrelatedto hydroelectric projects in Montana. Vol. III - Hungry Horse Project. Prep. by Montana Dept.Fish, Wildlife and Parks for Bonneville Power Admin., Portland, OR. 66p.

Casey, D., H. Rivera, S. Riley, J. Harper, .T. Grotzinger, and H. Nyberg. 1988. Northwest Montana wildlife habitat Enhancement: Elk/Mule Deer winter range, Hungry Horse Reservoir. Prep. by Montana Dept. Fish, Wildlife and Parks and USDA Forest Service for Bonneville Power Admin., Portland, OR. 30p.

Rice, W.R., and J.D. Harder. 1977. Application of multiple aerial sampling to a mark-recapture census of white-tailed deer. J. Wildl. Manage. 41(2):197-206.

Samuel; M.D., E.O. Garton, M.W. Schlegel, and R.G. Carson. 1982. Visibility bias during aerial surveys of elk in northcentral Idaho. J. Wildl. Manage. 51(3):622-630.

APPENDIX A

Estimated itemized costs for Prescribed Burning (Prepared by District Fire Officer, Hungry Horse District, Flathead National Forest):

BURNING COST FOR ONE PO-ACRE UNIT:

Preoare Burn Plan	$ 100.00
Pre-burn Inspection	
3 trips x 3hr each trip x $10.10/hr	90.90
40 mi. per trip x $0.22/mi. x 3 trips	26.40
1 flight at 1 hr x $45.00/hr	45.00
Mileage to airport and back, 60 mi x $0.22/mi	13.20
Driving time to and from airport, 2 x 1 1/2 hr x $14.23	42.69
Preparation	
Mix alumigel 0.75 hr x $10.10/hr	7.50
Mileage, H. Horse - Kalispell (7423) 60 mi x $0.22/mi	13.20
Mileage, H. Horse - Kalispell (Alumigel truck) 60X0.45	27.00
Driving time for each. trip, 1 1/2 hr x 2 trips x $10.10.	30.30
200 gal fuel x $1.15/gal	230.00
24 lb sure fire x $5.70/lb	136.00
Ignition	
Helieopter, 2 hr x $415.00/hr	830.00
Helicopter manager, 3 hr x $13.46/hr	40.38
Parking tender, 3 hr x $10.10/hr	30.30
Pump operator, 3 hr x $7.27/hr	21.18
Fire Boss, 3 hr x $18.36/hr	55.08
Alumigel truck mileage 40 mi x $0.45/mi	18.00
Small engine 40 mi x $0.45/mi	18.00
3/4 ton pickup truck 40 mi x $0.24/mi	9.60
F.O.R. on small engine one day	9.90
F.O.R. on pickup truck one day	7.40
Post-burn Monitoring	
3 trips x 3 hr x $10.10	90.90
3 trips x 40 mi x $0.22/mi	26.40
TOTAL COST	$1920.83
COST PER ACRE	$ 96.04

These estimates are for one, 20-acre unit at Firefighter Mountain. More than one unit or more than 20 acres would lower the cost per acre. Costs per acre for Dry Parks are likely to be $125 or more based on additional travel time and mileage.

COST PER DAY OF SLASHING:

5-man crew x 10 hr/day x $9.10/hr	$ 455.00
F.O.R. on truck	9.90
30 mi round trip x $0.24/mi	7.20
Saw deposit, gas, oil, chain at $5.00/day/saw	25.00
Supervision and inspection 2 hr x $10.10	20.20
TOTAL PER DAY	$ 517.30

FIXED COST PER SLASHING UNIT:

4 hr Wally Bennett x $18.36	73.44
4 hr Jerry Anderseon x $10.10	40.40
1 day F.O.R. on pickup	9.90
30 mi x $0.22/mi	6.60
TOTAL FIXED COST	$ 130.34

Slashing costs will therefore be a combination of fixed cost ($130/day) plus variable costs, which are dependent on the number of days needed to slash a given unit. Variable cost depends on walk-in time and number of stems per acre (how much per day can be slashed). Three examples of this variable cost based on one, 20-acre unit are as follows:

THICK:

1/2 acre per day per man = 40 man days = 8 days with a 5-man crew.
8 crew days x $517.30/day = $4138.40 variable costs.
$4138.40 variable + $130.34 fixed cost = $4268.74 or **$213.43/acre**

AVERAGE STEM DENSITY:

1 acre per day per man = 20 man days = 4 days with a 5-man crew.
4 crew days x $517.30/day = $2069.20 variable costs.
$2069.20 variable + $130.34 fixed cost = $2199.54 or **$109.97/acre**

LOGGED UNIT WHICH NEEDS SLASHING:

3 acres per day per man = 6.6 man days = 1.5 days with a 5-man crew.
1.5 crew days x $517.30/day = $775.95 variable costs
$775.95 variable + $130.34 fixed cost = $906.29 or **$45.31/acre**